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The Green Thumb

WINTER 1971



THE COVER

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THE GREEN THUMB

VOL. TWENTY-EIGHT, NUMBER ONE

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The Green Thumb

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DAVID A. BLADES, *Editor*

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in the new Education Building at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

Introducing —

THE EDUCATION BUILDING

WILLIAM G. GAMBILL

During the first week of March 1971 Denver Botanic Gardens will celebrate an event it has been anticipating for many months — the formal opening of the new Education Building. This handsome $850,000 structure is the latest building in the complex that has been officially named the Boettcher Memorial Center of Denver Botanic Gardens.

The building shares with the Boettcher Memorial Conservatory an impressive entrance-way and lobby court with its fountain and pool surrounded by a plant display area. Made possible by donations of numerous interested citizens and a generous $500,000 grant from the Boettcher Foundation the structure complements the diamond motif of the Conservatory. Hornbein and White, Architects, designed the Center; Gerald H. Phipps, Inc. served as general contractor.

With this fine building Denver Botanic Gardens, at last, is able to provide a magnificent autitorium, currently known as Horticulture Hall. Planned specifically as an exhibition room for large flower shows the auditorium is also capable of seating more than 400 persons for meetings, lectures, films, slide shows, plays and even concerts. Provided also in the building are three classrooms for instructional purposes and for meetings of various plant-oriented societies, spacious new quarters for the Helen K. Fowler Library, new facilities for the Kathryn M. Kalmbach Herbarium, a photographic dark room, a plant preparation room adjacent to Horticulture Hall, storage rooms, a research laboratory and a projection room.

The imposing entrance faces south serving the Conservatory to the west (left) and Education Building to the east (right). Practically all glass-enclosed it is approximately 32 feet wide and 17 feet high with four sets of double doors. Predominating the Lobby Court is a water fall and rectangular pool surrounded on three sides by display areas designed to hold pots of colorful or interesting plants seasonally appropriate. The cactus collection has recently been exhibited here.

Focal point from the entry is a bas-relief above a water fall; both are suspended from a wall screen of rough texture. The screen actually forms the fourth side of the pool and completes the north entry wall. Sculptured in pink Colorado travertine, the bas-relief, entitled "Rima," was created in 1955 by Edgar Britton, noted Denver sculptor, and is a gift to Denver Botanic Gardens from Mr. and Mrs. Victor Hornbein. Water cascades into the pool from a shelf-like basin beneath the sculpture to produce a pleasant musical sound. A skylight above a three-dimensional ceiling dramatically floods the entire pool area. The native red quartzite floor is a continuation of the adjacent

foyer to the Conservatory. Here, to the left of the Lobby Court, is also the office of the newly appointed Horticultural Education Specialist. This office formerly served as a storeroom for the Gift Shop. Cloakrooms and public restrooms are conveniently situated at the west of the Lobby Court.

Horticulture Hall

Horticulture Hall, a truly magnificent auditorium, is to the east of the Lobby Court. Approximately 64 feet square with a domed ceiling rising to a height of 32 feet, it has no interior supporting columns. Smoked plexiglass tetrahedrons in the peak of the dome permit entrance of some light but not enough to raise temperatures significantly during warm weather. The only other natural light is admitted through high doors on the east. These doors open onto a narrow balcony on the York street side of the building. At the south side of the auditorium is a large stage (24 feet wide and 22 feet deep) boasting a gracefully curved proscenium. Curtains, cyclorama and backdrop have been installed and a huge projection screen (19 feet by 10 feet) is permanently suspended at the rear of the stage. The projection room is reached through the Herbarium on the balcony level.

Horticulture Hall will accommodate 410 folding chairs (half are white and half, avocado) with an unobstructed view of the stage or they can be arranged in-the-round. About 50 display tables can be set up for flower shows or banquets. Beneath the glazed dome is a platform hydraulically operated and designed to lift plants and equipment from the basement to the main floor. Dollies can be loaded with folding chairs, folding tables or used to transport equipment from the lift to a large basement storeroom. The lift, about 10 feet square, may be left flush with the floor of Horticulture Hall or raised 4 feet above the floor and used as a large plant display platform in the center of the Hall. It has been considered, also, as a stage for chamber music or "concerts in-the-round."

Tawny, golden-brown indoor-outdoor carpet has been installed in Horticulture Hall, the Library, Herbarium, stairways, balcony and lounge. Doors and woodwork are detailed in oak and stained glass designs repeat accents found in the Conservatory complex.

Plant Preparation Room

Double doors on the north side of Horticulture Hall open to the plant preparation room. Here, tiled work counters slope toward trough-like sinks. Numerous water spigots along and above each counter can be used conveniently in filling containers at flower show time. Equipped with electric range, refrigerator and dishwasher the room can be used easily as kitchen area by caterers and others. Here, too, is a storage room as well as a walk-in refrigerator for holding plant specimens or floral arrangements at 40 degrees F. before flower shows. Flooring is vinyl tile.

Helen Fowler Library

Off the northwest corner of Horticulture Hall a small lounge is furnished with sofa, chairs and coffee table. From the lounge is an entry leading to the spacious quarters housing the books, periodicals and journals of the Helen K. Fowler Library. A rare book room holds the Waring Botanical Rare Book Collection donated by Mrs. James J. Waring. Checkout desk, workroom, and office for the library staff are located at the south end of the library. Library tables with chairs and book stacks in cheery yellow offer pleasant comfort and convenience for study.

Beige draperies decorate small windows on the north and east. An open metal staircase leads to a basement room of identical size for future library expansion and for storing books and periodicals formerly stored in the basement of Botanic Gardens House.

The main hallway from the Library descends to the basement level and ascends to the second floor. A balcony overlooking the Lobby Court below is designated as Herbarium Display Area and will contain glass-topped museum display cases as well as glassed wall cases. Exhibits will be shown of various kinds of plant materials, including non-living plant specimens, charts, pictures, books and plant materials significant in economic botany and horticulture.

Kathryn Kalmbach Herbarium

Adjacent to the balcony is the Herbarium, a depository for approximately 5,000 dried, mounted plant specimens with space to expand the collection eventually to 50,000 specimens. Besides standard herbarium cases the room has several work tables, chairs, and a work counter with sink along one wall. A storeroom is also provided.

Garden Level

Three classrooms which can double as meeting rooms and laboratories are located on the lower level. The main lecture room will accommodate 50 to 60 people with a portable dividing wall. The east classroom leads through double doors to the garden level. A laboratory and the micology collection occupy the area beneath the stage. The photographic darkroom as well as storage facilities for the Gift Shop and auditorium furniture are also located in the basement.

Boettcher Memorial Center of Denver Botanic Gardens, as of March 6, assumes its responsibilities in providing botanical education and enjoyment to the citizens of Denver and Colorado.

CORRECTION, PLEASE

In the Autumn 1970 issue of *The Green Thumb* it was inadvertently stated that "Low Shrubs for Colorado Landscaping" by George Kelly, p. 103, was the reprint of Mr. Kelly's list of low shrubs which appeared in the October 1948 issue of *The Green Thumb* together with a supplemental list. In truth, it was the supplemental list only. Our apologies to Mr. Kelly and to our readers who may have been misled by this erroneous information. For those wishing to know more about low shrubs for Colorado landscaping, we refer you to *The Green Thumb* for October 1948 where you will find George Kelly's complete list or to his current book, *Rocky Mountain Horticulture,* which contains essentially the same material. Past issues of *The Green Thumb* are available for reference in the Helen Fowler library.



Bottle Gardens

HELEN D. STANLEY

GARDENING under glass started in England over a hundred years ago when Dr. Nathaniel B. Ward discovered that many plants would grow and thrive in this type of environment. He devised a container called a Wardian Case and growing a garden in one of these became a popular Victorian pastime. Queen Victoria indulged in the hobby and kept a number of these gardens in her living quarters. The cases were pretty things and when planted became highly prized possessions. The bottle garden is a direct descendent of Dr. Ward's little Victorian contraption.

Glass gardening has undergone a renascence during the past decade. More leisure time in which to pursue hobbies, a deeper interest in growing things along with an increase in apartment living has caused many people to engage in this type of indoor gardening. The marvelous therapy derived from making a bottle garden cannot be measured against a session on a psychiatrist's couch! There is a lovely and mysterious quality to a well made garden. It is a small world apart, self-sustaining as it creates its own weather and changing from day to day as tiny fronds and new leaves unfold. And if perchance a blossom should appear in this bit of captive nature, you who made it will experience a surge of motherhood! After all you created the thing. This is worth six sessions on the couch.

The first step in your project is to select a bottle. There are all sorts but the larger the bottle, the better the garden will thrive and the longer it will last. Use clear glass as tinted glass tends to prevent the proper infiltration of light. Have your container squeaky clean inside. Sterilize it by pouring boiling water in it after warming it up sufficiently to keep it from breaking.

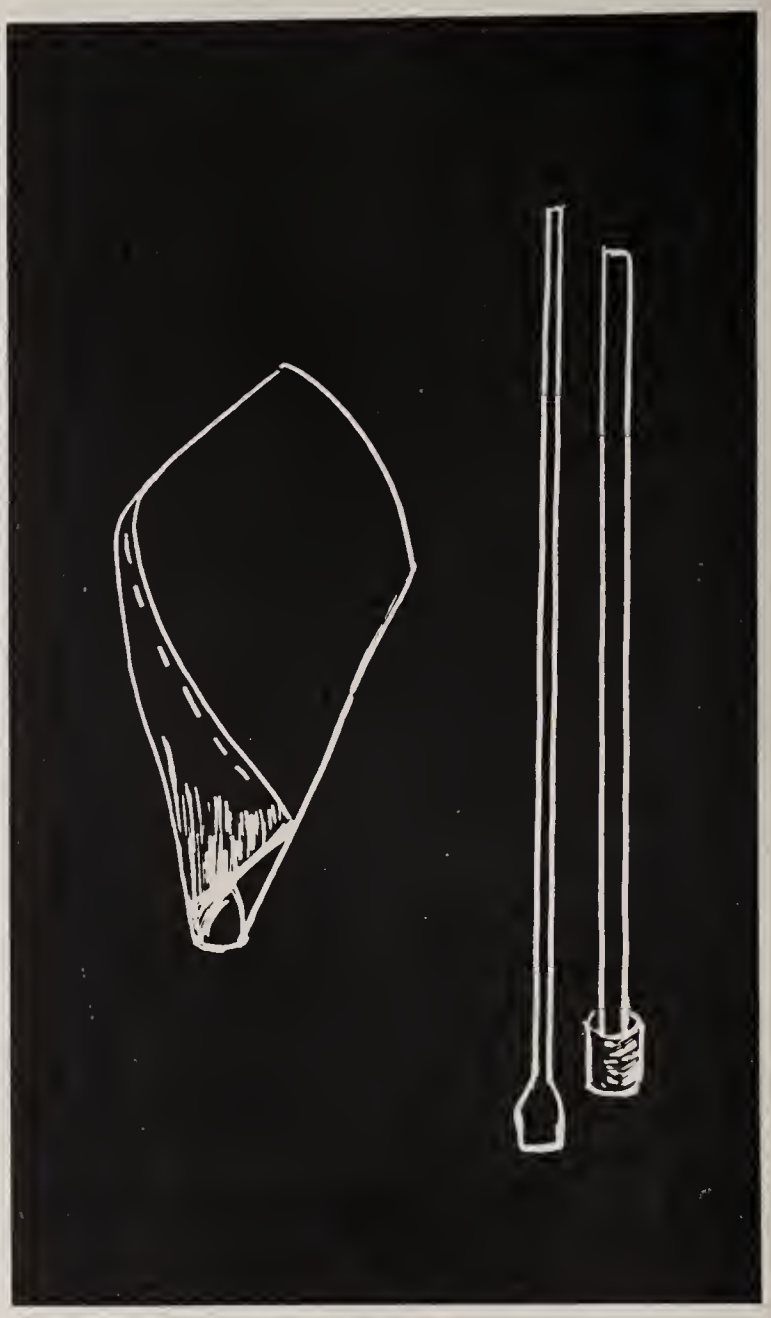
It is easier to make your garden if you assemble all materials needed as a good cook does when she bakes a cake. Materials may include small gravel, soil, plants, tools and charcoal. Find a place to work where you can

leave the mess (and mess it is!) undisturbed for as long as it takes to make the garden. It could take several days. Don't work when you are tired and feel like yelling at the plants when they don't cooperate with the delicate task of placing and arranging them.

The tools you work with are simple and you devise, invent and improvise them yourself. A wire coat hanger straightened and twisted into a curled end big enough to cradle a plant and small enough to enter the opening of the bottle is the gadget you use to place the plants. A Chinese back scratcher whittled to fit, chop sticks, a long pointer type stick and a kitchen funnel are all useful. For a large bottle a long roll of cardboard or a hollow pipe can be used to funnel the soil. It can be angled so that soil will flow where you want it to. This method helps to keep the insides of the bottle clean. Part of the fun in making a garden is seeing how clever you are in getting the plants in and placed artistically. With these tools you dig little holes and maneuver the plants in place and cover the roots without injuring them.

The success of your garden depends largely on the foundation and the soil mixture. Always use sterilized soil. You can buy this or you can sterilize it yourself by sifting it into a pan, covering it with water and simmering it a few minutes on the stove. Dry it thoroughly before using. Add peat moss and sand and work in a little crushed perlite and some charcoal granules. The latter keeps the soil sweet. The proportions are roughly one part potting soil, one part sand and one part peat moss by volume. The proportions could vary with the type of plants used. The mixture should not be too rich as this causes the plants to grow too fast and in no time, you will have a tangled jungle on your hands!

Cover the bottom of the bottle with small gravel which has also been sterilized or thoroughly washed and dried. About an inch will do for a larger garden. Cover this with a thin layer of



charcoal. Insert the prepared soil into whatever funnel you have, being careful not to get the insides of the glass dirty. Use about three inches for a large bottle, less for a smaller one. Make the landscape uneven; build the soil up toward the back. Wash your plants free of any soil and insert them with the coathanger tool, first digging a little hole with your stick. Getting the plant loose from the tool, covering the roots with soil and tamping is a problem you will have to grapple with yourself. It really takes some doing! For artistic results, be sure your plants are varied in size and coloring and be sure to



leave room for growth. Remember the garden is supposed to last a long time. Bits of colored rock (copper rock is a lovely blue) can be sprinkled over the landscape and tiny rotting logs for accents. Some like a woodland animal or two peering from the forest; these are optional.

You have been working with dry soil so far and there must be some moisture. The best way to provide this is to tip the bottle gently and pour in tablespoons of water, letting it run down the sides. This also cleans the glass of any soil. Repeat this, turning the bottle around until the soil is damp but NOT soggy. A little water poured directly into the opening will dampen the middle. Don't upset the plants and don't be heavy handed with the water. You can test with one of your tools after a few days, bringing up a bit of soil and judging the wetness. Droplets will form on the inside of the bottle and this gives the plants the humid atmosphere they thrive in. The garden should be placed in a cool bright (no sun) place for a week or so to "ripen" and so the plants can become settled in their new home.

If the garden clouds up too much (and it will at first) you can make another tool to wipe down the inside. Twist a light wire hanger in various shapes as needed to do the job; tie wads of absorbent material on the tip with string or rubber bands (be sure the material is held firmly as it is a disaster if it drops off) and ever so carefully rub down the insides. The removed moisture will clear the view.

There are many plants which do well in a bottle garden. Listed below are a few.

Artillery Plant (*Pilea microphylla* Liebm.)
Aluminum Plant (*Pilea cadieri* Gagnep. & Guill.)
Asparagus Fern (*Asparagus sprengeri* Regel.)
Boston Fern (*Nephrolepis exaltata* Schott)
Dwarf Palm (*Collinia elegans* Liebm.)
Corn Plant (*Dracaena* L.)
Creeping Charlie (*Pilea nummulariaefolia* Wedd.)
Finger Aralia (*Dizygotheca elegantissima* Vig. & Guill.)
Ivy (various small leafed varieties) (*Hedera* L.)
Pepper Face (*Peperomia obtusifolia* A. Dietr.)
Wandering Jew (Miniature Varieties)
Watermelon Begonia (*Peperomia sandersii* C. DC.)
Coleus (Various Varieties) (*Coleus* Lour.)
Boxwood (Small Varieties) (*Buxus* L.)
Podcarpus (Small Varieties) (*Podocarpus* L'Her)
Baby's Tears (*Helxine soleirolii* Req.)

Your garden should be placed as you would a cherished art object. For a dramatic effect, at night place a light behind it. In the daytime, place it where it gets plenty of light but not in the direct rays of the sun. Occasionally, it might need the addition of a little water and you will learn to judge this for yourself. You might have to replace a plant from time to time. A plant might outgrow the garden or get scrawny or just lie down and die.

These gardens make wonderful gifts for a shut-in, a child or a garden lover. They look great on a man's desk in a business office. They are conversation pieces, guaranteed to start the talk. The first question people will ask is: "How in the world did you get those plants in that bottle?"

Exotics of Colorado . . .

Pinus sylvestris, Scotch Pine

HELEN MARSH ZEINER



Pinus sylvestris L., Scotch pine or Scots pine, is one of the large ornamental evergreen conifers planted in the Denver area. A good place to see this tree is on the Denver Country Club grounds adjacent to South University Boulevard, where Scotch pines are growing in a row along the edge of the country club property and are plainly visible from the street.

Scotch pine is a two-needle pine, with blue-green needles varying in length from 1½-3 inches. They are usually twisted. The foliage is sometimes rather sparse.

Cones are small — only about 1-2½ inches long. They are stout-stalked, with dull, yellowish-brown thick scales with a tiny central prickle.

The tree forms an irregular crown with spreading branches, which, with the sometimes scant foliage, gives an open effect. One of the best identifying characteristics is the orange or orange-red bark on the large branches and the upper trunk; this is easily seen on the trees mentioned above. Bark on the main trunk is gray.

Scotch pine may reach a height of 80 feet in this area; in its native habitats, when conditions are favorable, it may grow to a height of 150 feet.

Pinus sylvestris is native to Europe, where it is widely distributed across the continent as well as in northern Asia. It makes up the bulk of the forests of northern Germany and Russia. It often forms pure stands, particularly on poor soils. On better soils it may be associated with other conifers such as Norway spruce. The tree is found in Scotland, as the common name tells us; it is found growing in association with European white birch in the highlands, but on the peat moors it is associated with aspen and alder.

Pinus sylvestris is a very important timber tree in Europe. The wood is used for general construction. It has been planted in this country for commercial purposes, but has not proved

to be very successful because the first seeds planted were not taken from good stock, and the trunks grew crooked and the wood was not of good quality. However, selection of seeds from better stock is expected to result in commercially useful plantings of trees in the United States.

Scotch pines have been widely planted for shelter belts and for ornamentals, both in the United States and in Canada. Since the mature tree is large, it is a better tree for parks and public grounds than for most homes. This much-planted tree is becoming naturalized, and is well-established in the northeastern part of the United States.

Pinus sylvestris is not particular as to soil or climate, and is said to be resistant to city smoke.

George Kelly, in *Rocky Mountain Horticulture is Different,* says that Scotch pine seems to be as hardy as the natives. He also says that it is the most rapid growing of all pines for this area, but he does not consider it as beautiful as either Austrian pine (an exotic) or our native ponderosa pine. Both Austrian and ponderosa pines are typically more regular in shape and the foliage is long-needled and denser than that of Scotch pine. However, the irregular crown of Scotch pine has an attraction of its own and it does add interest and variety to the landscape.

Flowers to You

It's not a home until it's planted and we do need beauty, inside and out. We love our family and home and can express that impressively with a yard and garden of flowers.

Sometimes we may travel away, on vacations or otherwise, finding something to bring back to make home more livable and attractive.

All-America Selections, current flower winners as the best of their kinds, are planted in Demonstration Gardens from Bermuda to Honolulu, in Canada and over the United States.

More recent All-America gardens are in South Africa and New Zealand. Thousands of visitors see these well labeled award varieties in the fifty-five famous botanical park and institutional gardens.

Varieties of individual choice may be noted and purchased conveniently from reliable garden seed firms. Even if one has not had the "green thumb" success desired and needs the courage to plant again, a gardener has that courage. Garden and gardener improve, always dreaming again for a more exciting, interesting beautiful garden.

After all, gardening is the greatest hobby on earth and the whole family can take part. We all should have a dream of a garden.

INTERNATIONAL BONSAI CONVENTION

Cleveland, Ohio May 28-31, 1971

Sponsored by Bonsai Clubs International — Contact Keith Scott, Program Chairman — 17771 Snyder Rd., Chagrin Falls, Ohio 44022.

Turfgrass Varieties for COLORADO

DAVE BOYLE,
Extension Horticulturist, Jefferson County

Grass is the most important family of flowering plants known to man. It is a major source of food (wheat, rice, barley, corn, sugarcane; it is extensively used for grazing; and it finds a multitude of uses in recreation, beautification, and soil conservation. There are over 5,000 species of grass found in the world, 1,400 of which occur in this country. Approximately 25 of these species are adapted for use as turfgrasses. Even fewer are grown in Colorado for lawns, parks, golf courses, and other recreational and beautification purposes.

The principal turf species used in Colorado is Kentucky bluegrass (*Poa pratensis* L.). Many varieties of Kentucky bluegrass are available commercially as seed or sod. This article will be primarily concerned with a discussion of the characteristics of Kentucky bluegrass and some of its more common varieties.

Kentucky bluegrass is a fine-bladed, cool-season, perennial grass that spreads by rhizomes and forms a dense cover under favorable conditions. It is suited primarily to the northern portions of the country. It can adapt to most growing conditions, with the exception of extremely high temperatures. Bluegrass has the ability to withstand long dry periods, but does not remain green without some precipitation or supplemental irrigation. Being a cool-season grass, it puts out much of its growth, especially root growth, during the cooler spring and fall months, and goes into a semi-dormant state during periods of temperature extremes. However, with the increasing use of turf dyes, it is possible to keep grass green 12 months a year.

Choosing a turfgrass for your own use is primarily a matter of economics and personal preference. The price of bluegrass seed varies each year according to the supply. The retail price of seed runs all the way from 50 cents per lb. for the least expensive varieties, up to $5.00 per lb. for the more expensive ones. This is quite a broad range, and may seem expensive, however the initial investment for the seed (or sod) is probably the smallest expense in planting and maintaining turfgrass.

It does not pay to try to save money on seed, because, as with most purchases, you get what you pay for. Good quality seed is a must. It should be of a high germination and purity percentage — above 90% if possible. It is best to stick to one variety rather than buying a mixture, for the purpose of maintaining uniform color and texture in a lawn.

A discussion of the qualities, both good and bad, of some of the bluegrass varieties is included in the following table.

VARIETIES	GOOD POINTS	BAD POINTS
Common Kentucky Bluegrass Forms a dense sod. Leaves dark green smooth and soft. Not a pure strain, contains many types.	Probably best all around cool-season grass. Low cost. Readily available.	Susceptible to a number of diseases. Requires higher mowing 1½" - 2".
Merion Wide blade, small seed. More prostrate and dense. Dark blue-green (Ardmore, Penn, A single plant selection.) 1947.	More drought-resistant. More tolerant of several diseases, especially leafspot. Stands closer mowing and hard use. Vigorous. Heals rapidly. Usually wins lawn contests.	Susceptible to rust. Needs extra feeding. Slow to germinate. May form excess thatch. Can't tolerate phenyl mercury (PMAS) sprays or shade.
Newport About same texture as Merion. From a collection of individual plants. (Pullman, Washington)	Less susceptible to rust than Merion. Requires less fertilizer than Merion. Develops rapidly. More rust resistant than Merion. Good fall color, and growth.	May not maintain stand. Becomes stemmy. Susceptible to leafspot disease. May winter kill somewhat.
Delta Finer, stiffer, more erect but not as dense as common Kentucky. (Ottawa, Canada) 1938. Adapted to cooler areas.	Survives more drought and heat. Marked resistance to mildew. Seedlings are vigorous.	Highly susceptible to leafspot disease. Light color. Early dormancy.
Park Similar to common. A mixture of 15 parent plant selections. (Minn. Ag. Exp. Station) 1957.	Good seedling vigor. More rust and mildew resistant than Merion. Germinates rapidly.	Highly susceptible to leafspot disease. Early dormancy. May thin out as it gets older.
Arboretum A mixture of several Missouri bluegrasses. (Missouri Botanical Garden.)	Survives well in southern limited bluegrass zone. Tolerates drought.	Highly susceptible to leafspot disease.
Troy Tall, erect growing. (From Montana Ag. Sta. from plants from Turkey.) 1955.	Adapted to cooler areas. Vigorous.	Highly susceptible to leafspot disease. May develop a coarse open turf.
Windsor From Scott's from several plant selections. 1962.	Said to be highly resistant to leafspot and rust. Said to be drought-resistant. Low growing, dense.	Expensive, susceptible to stripe smut.
Cougar New, from Pacific Northwest (1964) dark green, low-growing.	Stands close mowing, and hard use. Forms dense, low-growing turf. Good for recreation areas.	Somewhat coarse, susceptible to some diseases, especially stripe smut.
Fylking New, from Washington (Jacklin Seed Co.) 1962.	Stands close mowing. Somewhat resistant to leafspot, rust, and stripe smut. Fine texture.	Intermediate rate of germination. Can not be neglected. Slow to thicken up. May form excess thatch.
Prato Dutch selection (Northrup King).	Dense, moderately disease-resistant. Stands closer mowing. Establishes quickly.	Susceptible to leafspot and stripe smut.
Pennstar 1967 Pennsylvania, similar to Merion.	Dark green, similar to Merion. Disease resistant.	More susceptible to sod webworm.
Kenblue		

ALIGNING OUR HIGHWAY With Environmental Landscape Design*

GERALD F. KESSLER, *Landscape Architect*

Colorado is most fortunate in having an abundance of natural scenic beauty. It should therefore be assumed that all roads can and should be scenic roads.

As the programmed highway transportation system throughout the nation and state becomes a reality we are more and more aware of the broad influence road design has on our community's daily life. Neighborhood quality, community growth, land values, tax influences, where people live, open spaces, barrier effects of highway traffic — all are important parts of our environment that must be considered in highway design.

Compatible natural landscape development is so much a function of today's highway design that it is inaccurate to think of roads as an independent factor of the total landscape plan, but must be an integral part of the use of land in the country and city where we reside.

States that have taken action to protect scenic development include Massachusetts, Michigan, Oregon, Texas, Wisconsin and Hawaii. These states are well aware of their diminishing natural environment and are trying to preserve and develop effective use of remaining natural land areas.

Colorado's open range and mountainous terrain is diminishing and can no longer be treated as an expendable and inexhaustible resource. Colorado's tourist appeal is based almost entirely upon automobile travel and therefore is virtually dependent on the quality of Colorado's roads. By 1971 Colorado's tourist industry is expected to approach, or surpass a billion dollars annually making tourism Colorado's number one industry. The anticipated population increase in Colorado is directly related to the way in which Colorado develops its roads and utilizes its natural landscape.

*Length of this article and the need for continuing variety in this small publication necessitates printing the final, but shorter, installment in the next issue of *The Green Thumb*.

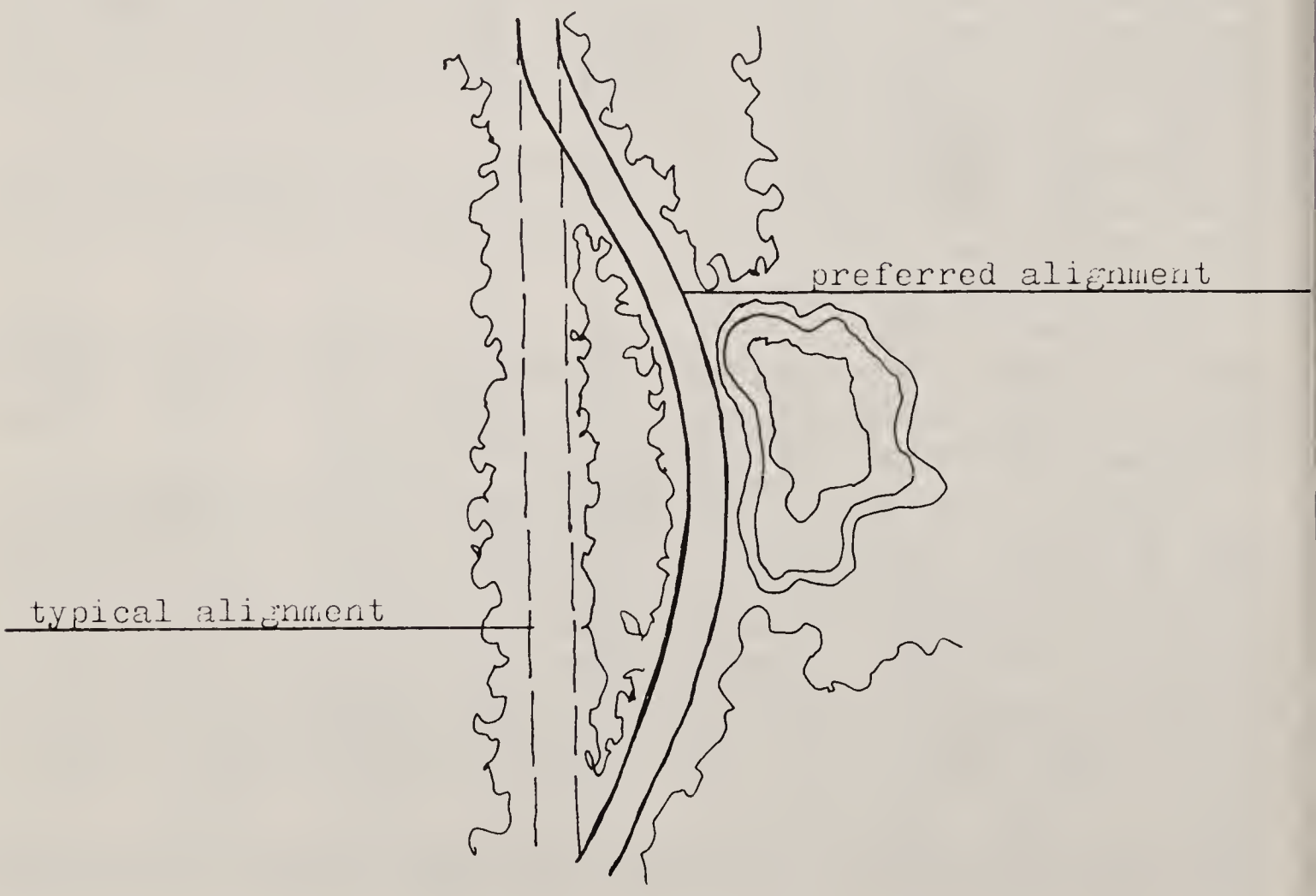
New York State's scenic parkways (pioneered in 1913) integrated the landscape with curved roads and wide, natural, scenic, corridors. Effective use of natural and created views and protective screen planting increases the beauty and community value of these parkways and contributes to the livability of the urban areas as well as providing substantial tax return and are now a priceless asset to state and local community.

A special California legislation has emphasized the importance of scenery and property preservation. The Counties are authorized to develop local systems of scenic roads that complement the other main state highway system. The "complete highway" concept emphasizes safety, utility, economy of construction, maintenance, and scenic beauty with special emphasis on maintaining and protecting adjacent physical land and visual values.

LANDSCAPE DESIGN

Many of the costly scars of our Colorado highway landscape could have been avoided by proper evaluation of natural landscape prior to route selection and engineering right of way limitations. Considering drainage, erosion, climate, scenic quality, existing and future community values, is as important a part of route selection as the geometry of the shortest distance between two points has been overly emphasized as a guide line for Colorado highways of the past.

A complete environmental design team representing all design professions would provide qualified assistance in route selection. They must have all available information to review prior to design in order to be effective and anything that has bearing on the potential choices must be made available to them. A planned approach to scenic beauty and the form of a particular landscape, plus avoidance of scars, must be incorporated into the road design during this first design stage.



Citizens are now aware of the influence road design has on our communities and way of life. An environmental design team within the highway department to provide technical assistance would certainly provide a planned approach to preservation of our natural environment and more awareness of our beautiful State of Colorado.



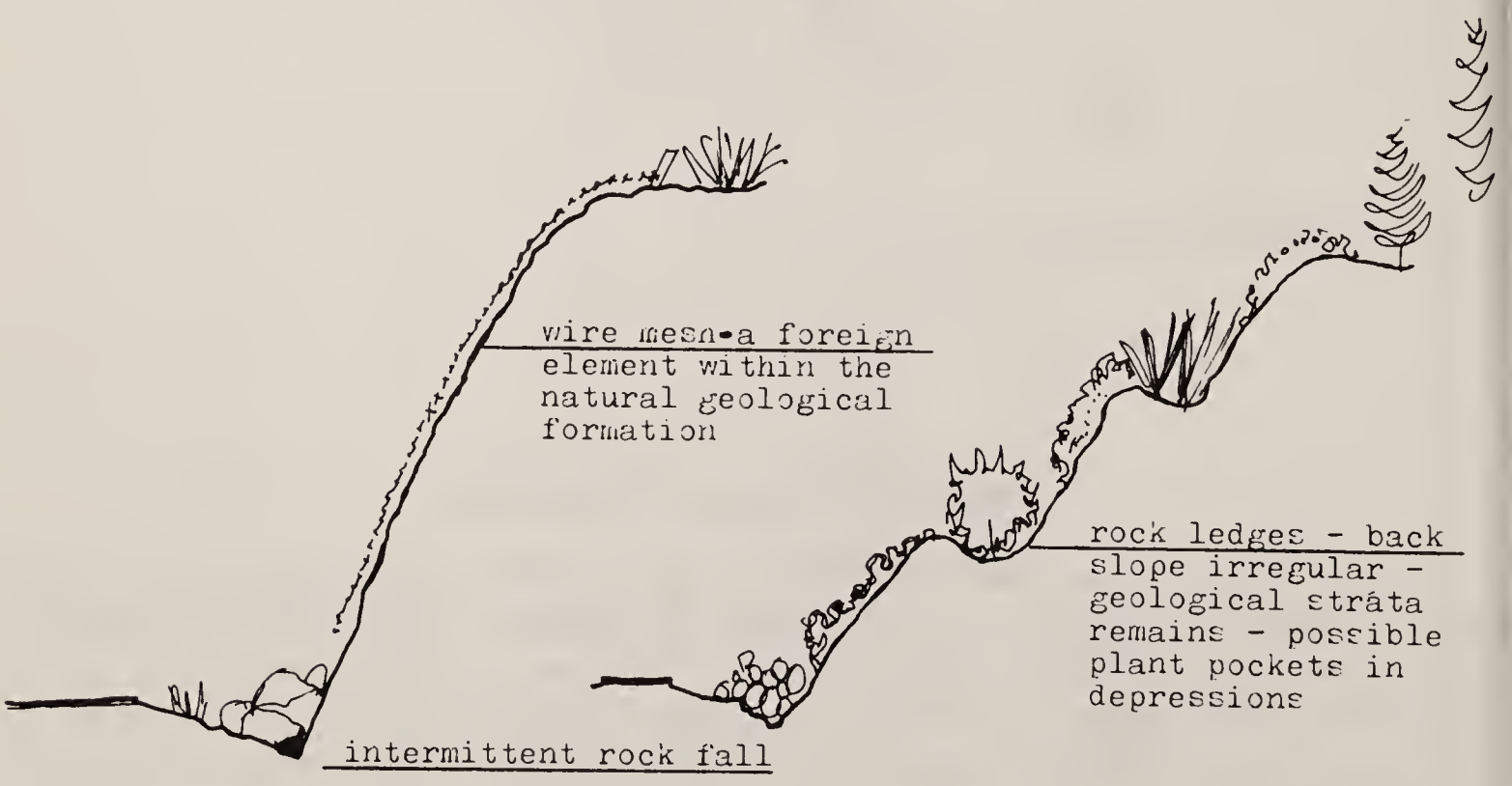
MOUNTAINOUS TERRAIN

In the mountains, proper complimentary, sensitive engineering design should provide natural appearing, easy flowing, alignment of roads, bridges and short tunnels to leave hillside, mountain streams and canyons unmarred. These natural amenities and wonders of Colorado are what tourists and local citizens drive the highways to see and they must be saved to be enjoyed. This creative concept and design approach to mountain driving is used in Hawaii with very dramatic and effective results.

Cut and fill construction used wisely is no more costly as a tool for revealing beauty and hiding scars than leveling vertical alignments.

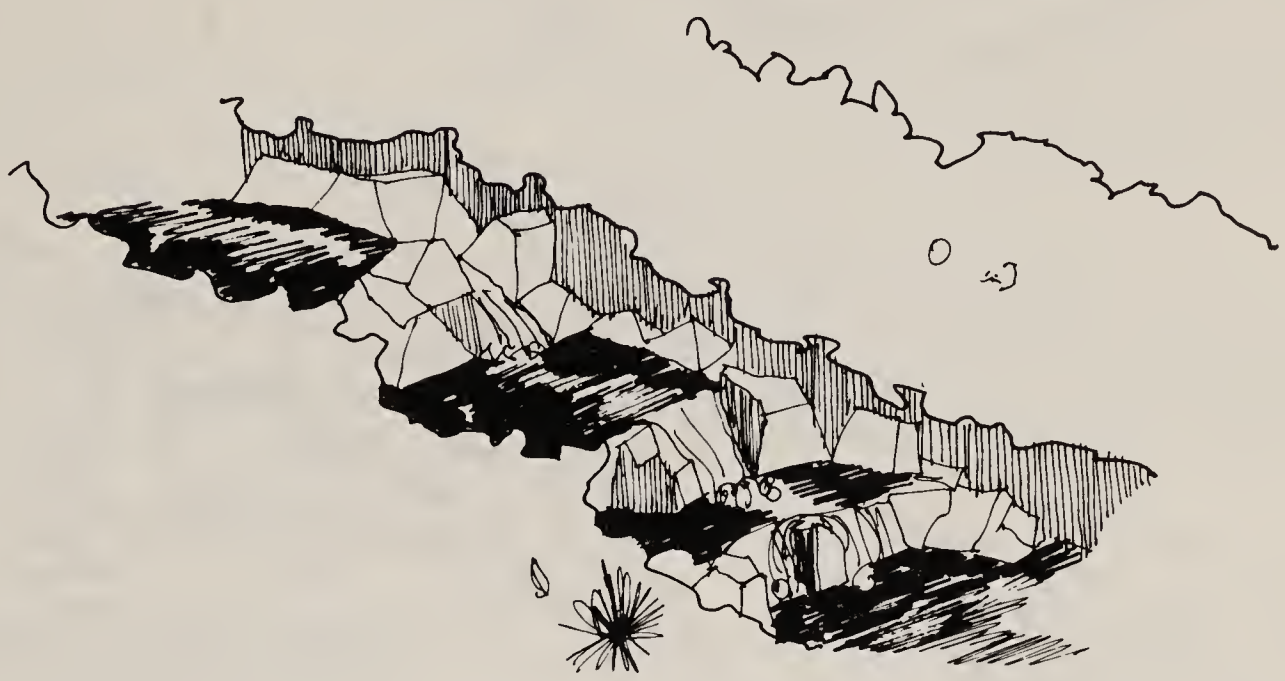


Landscape design can reduce continuing maintenance costs as initial construction costs, if applied during the early planning phases.



Advance consideration given to ground forms, embankments, plant pockets and terracing can provide erosion control and water-holding capacity on a slope — providing a continuous reduction in maintenance costs for the full life of the highway right of way. Slopes can be designed to reduce water run-off and reduce erosion to a minimum by absorbing the moisture and stopping mud from being washed onto the road surface.

Check dams can also be used to promote growth to the surrounding land and prevent, or retain, the fast overflow that occurs after an unusually heavy rainstorm.

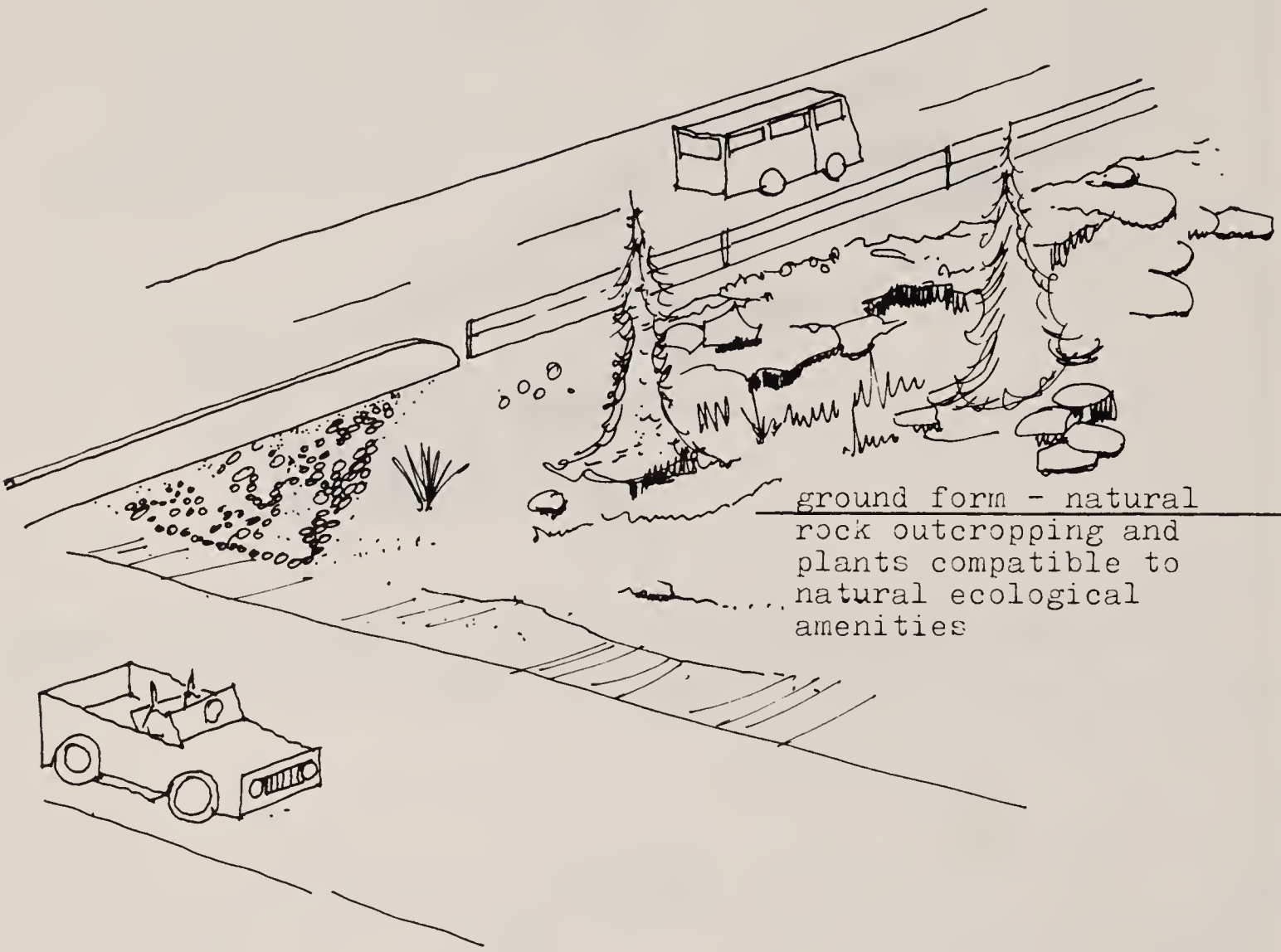


Our beautiful Colorado should be *kept* beautiful. We have so many native materials and natural landscape plants to work with and they should be used in the road design and development.

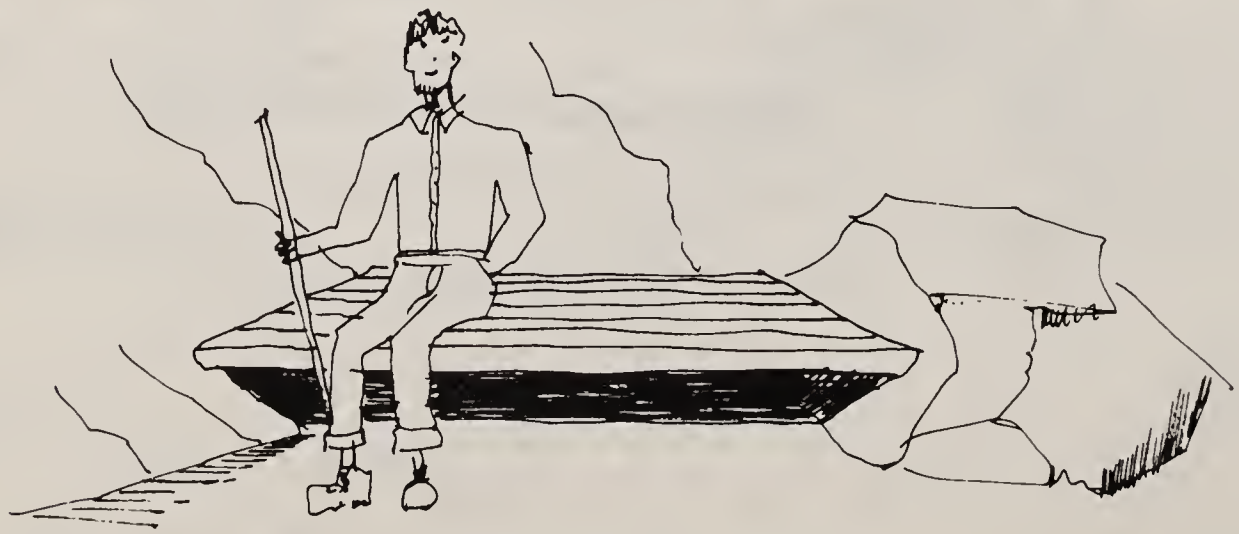


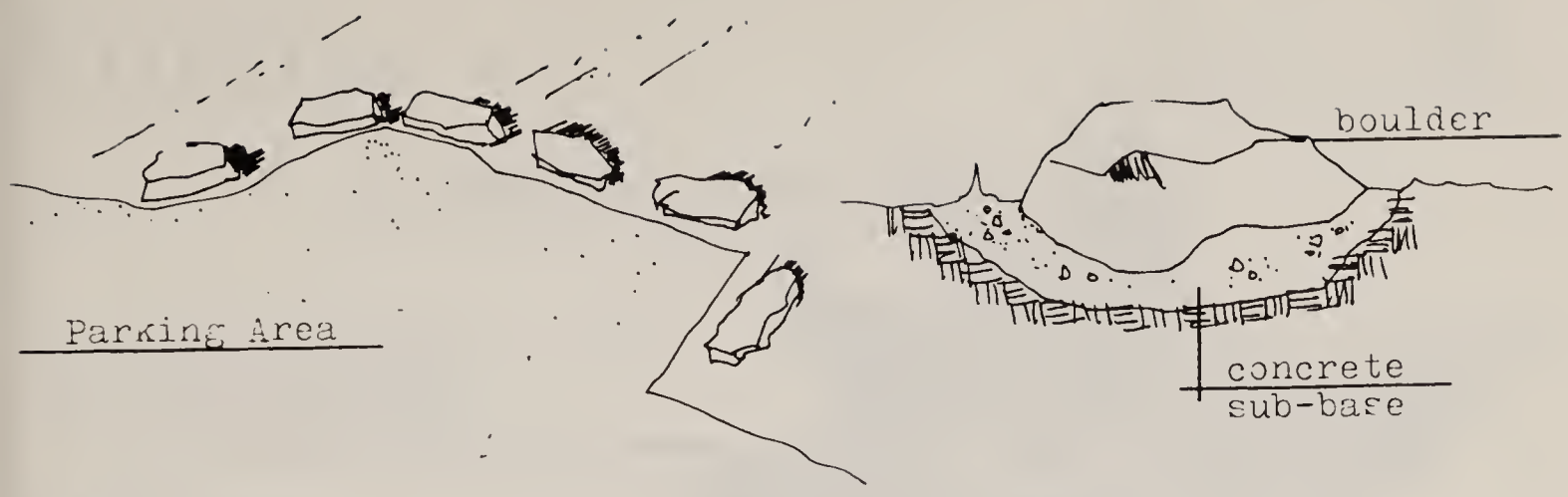
ROADS ARE PART OF OUR LANDSCAPE

How well roads fit into the natural landscape is closely related to how well the structural qualities of the natural environment and the man-made qualities are compatible. In Colorado yucca, sagebrush, cacti and other native varieties of ground cover plants and rock can be combined to create a natural appearing formation providing the natural continuity with surrounding areas. This is what a road landscape design could do in reducing initial costs and reducing maintenance and replacements costs.

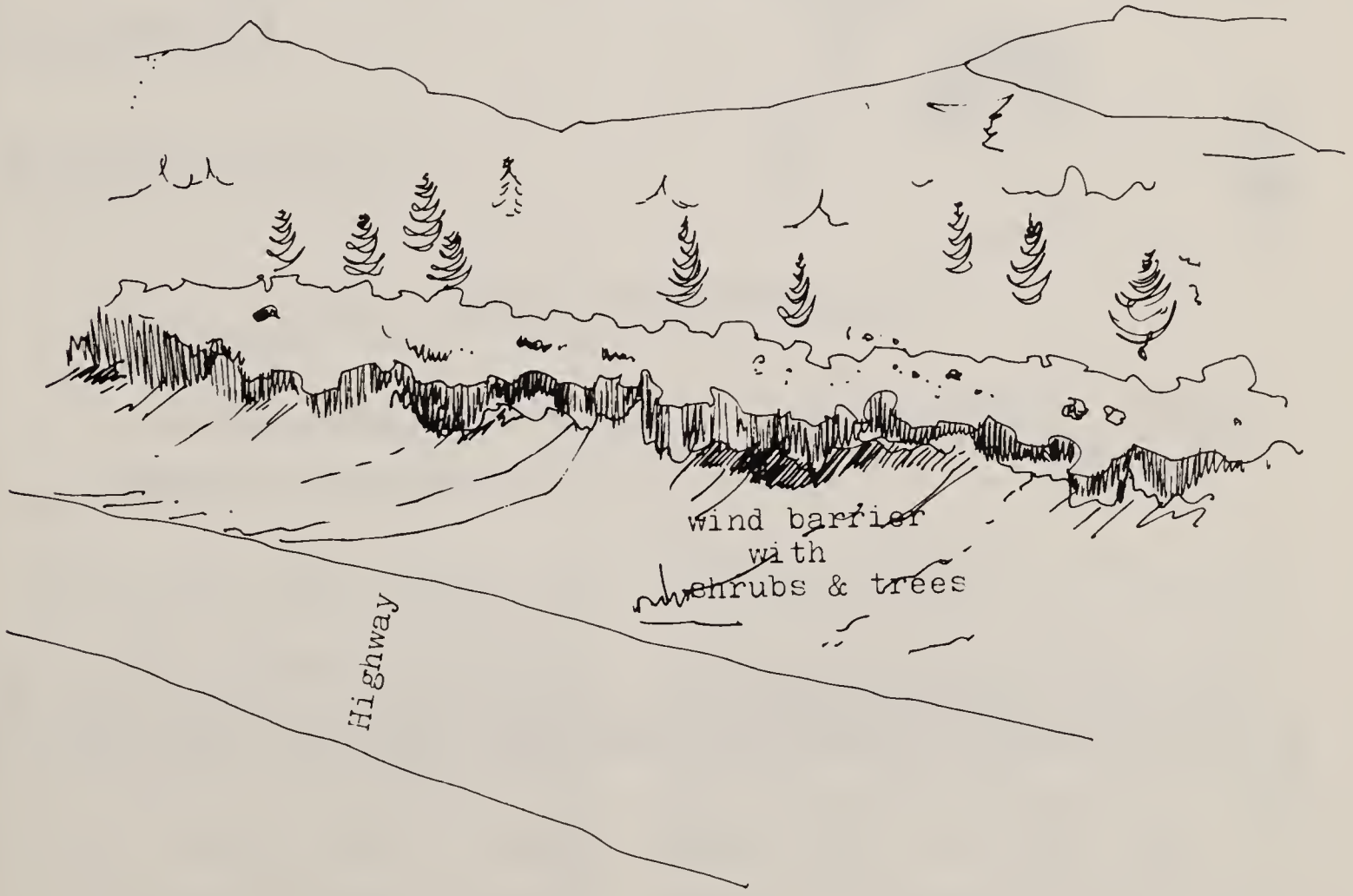


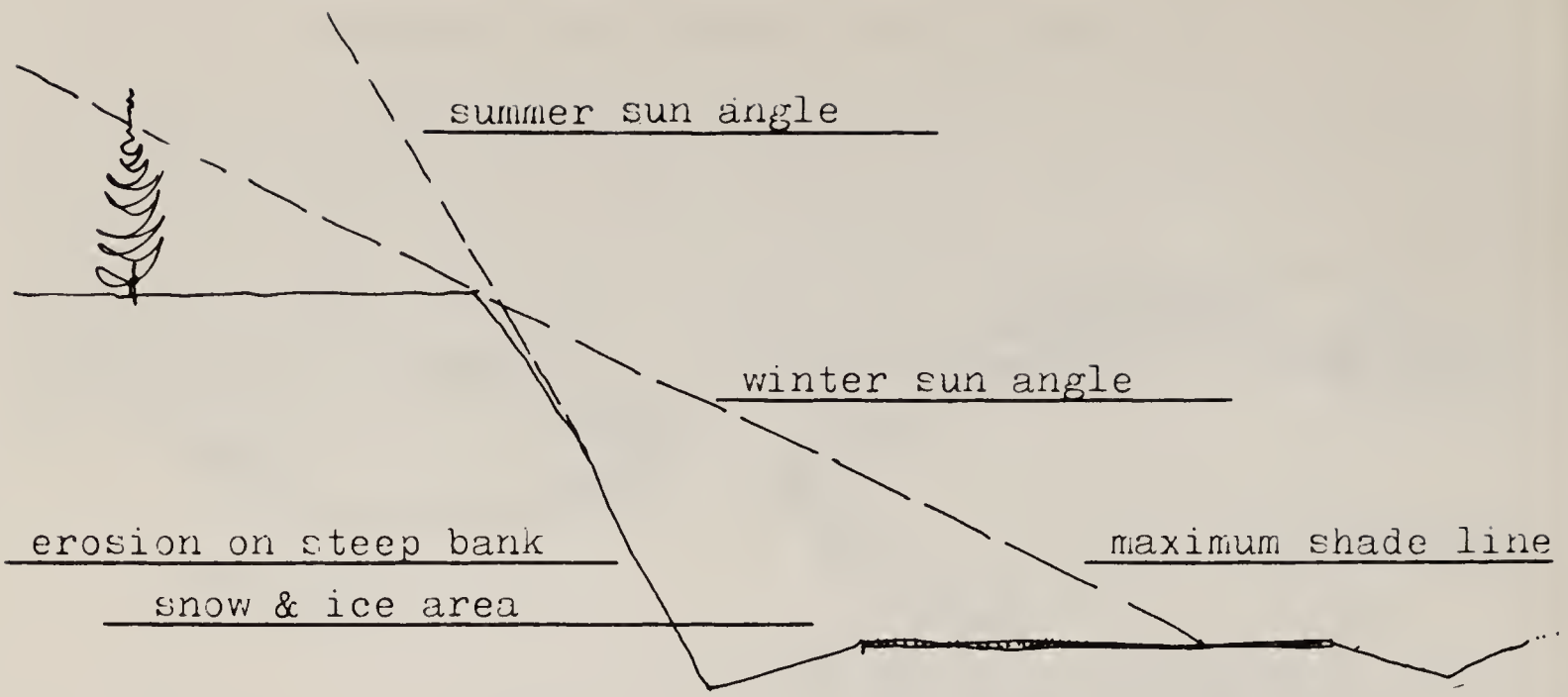
The use of native materials in an area can create an imaginative roadside development and at the same time discourage vandalism.



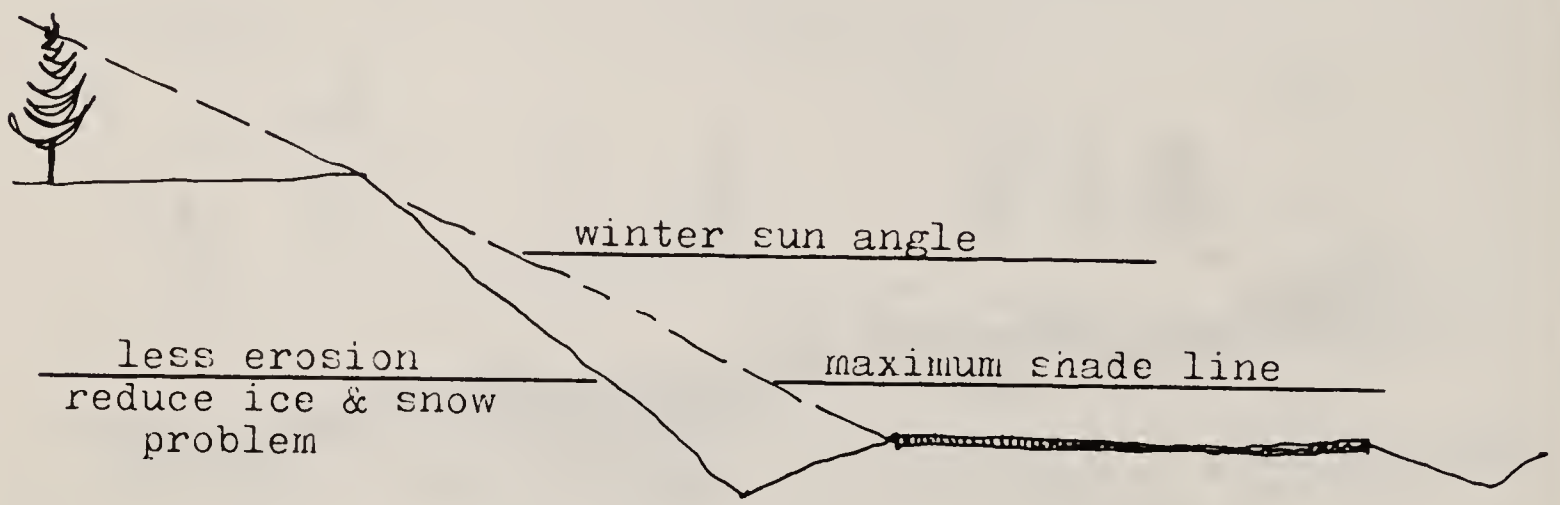


Live wind and snow fences can be made with tree or shrub growth and ground form to give a natural and highly scenic climate barrier for the life of the road. Doing this when the initial route is designed helps control the selection and cutting of trees which act as a functional maintenance aid to the highway.





Sunlight is another factor in road selection; along with slope selection and contouring of the ground with the type and character of planting considered. A steep north slope will substantially shade the road causing freezing of any moisture on the road surface resulting in extremely hazardous driving conditions. Proper design for sunlight control can eliminate such icy spots and also minimize low-lying fog pockets, potential avalanche of rock slides and snow drifting. The simple technique of carrying the shoulder out further and making the slope a little flatter accomplishes a number of things: no shadow on the road, less soil erosion on the slope, less snow drifting and a clear road for driving.



Sometimes cutting back high ridge on the outside of a curve will improve the highway interest with safer driving and better view of the road at the same time.

To be concluded in Spring issue

Focus on *Pimenta dioica* in the Boettcher Memorial Conservatory



Peg Hayward

Pimenta dioica Merr., allspice, one of the spicy myrtles (*Myrtaceae*) is an important economic plant included in the Boettcher Memorial Conservatory collection. The crushed leaves, pungent flowers and fruit have a scent and flavor which seem to combine those of cinnamon, nutmeg, and cloves and bestow on the tree the name of allspice. This spice is usually known as pimento outside the United States. It was discovered in the Caribbean Islands by the early Spanish explorers in the sixteenth century, and because the berries bear some resemblance in shape and flavor to peppercorns (from which black and white pepper are ground), the Spaniards gave them the name *pimienta* (pepper) a name later corrupted and anglicized to pimento.

The former specific title, *officinalis,* originally meant "of a workshop"; then it signified use in the arts and in medicine.

Pimenta dioica is a native of the West Indies and Central America. It is the only major spice grown on a commercial basis exclusively in the Western Hemisphere. Most allspice is grown on the island of Jamaica, but it is also produced in Guatemala, Honduras, Mexico, Brazil, and the Leeward Islands. Efforts have failed to introduce allspice to other parts of the world.

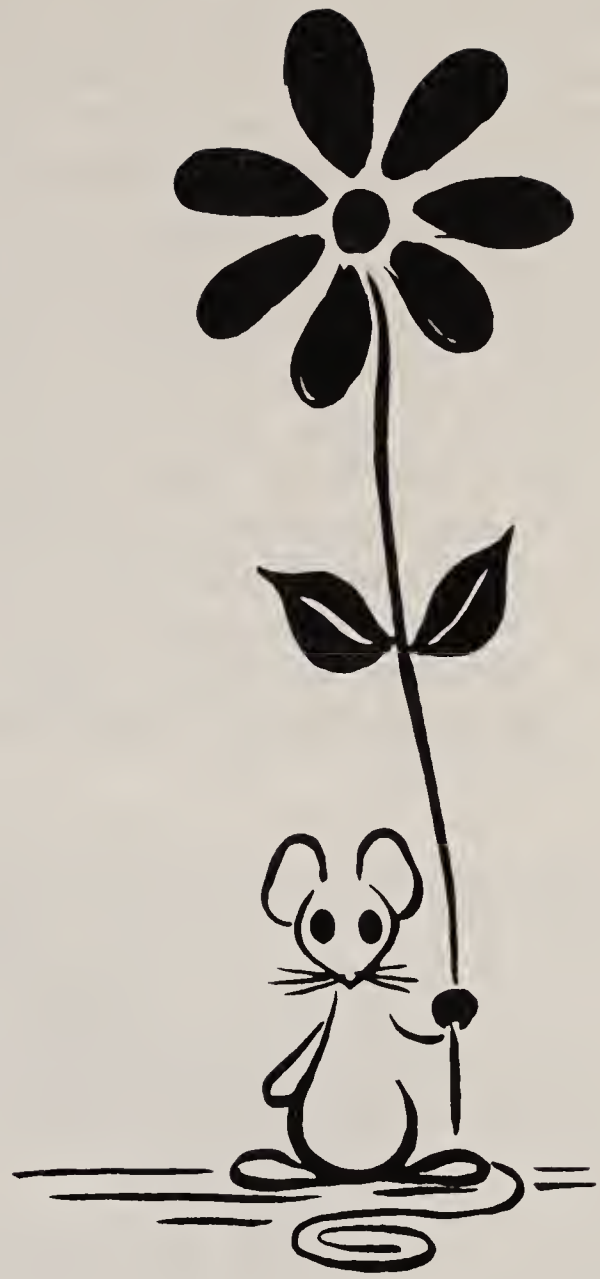
Allspice is a medium-sized evergreen tree, 25 to 40 feet tall, with a slender upright trunk and smooth grayish bark, which sometimes peels or is mottled with whitish patches. The branches and twigs are dotted with aromatic oil glands. Leaves are opposite, leathery, and usually thick. They are elliptic or broadest toward the tip and 4 to 6 inches long. The blades are reddish when young. Clusters of small, white fragrant flowers are borne in the leaf axils or on the tips of leafy shoots, but they are not showy. The allspice or pimento berries of commerce are nearly round, ranging in size up to ¼ inch in diameter and are crowned with the remains of the calyx. The berries are gathered as soon as they have attained full size, but while unripe and green. They are spread out and exposed to the sun and air for some days. The green color of the fresh fruit changes to reddish brown when dry.

Pimento is usually grown from seed, selected from well-developed fruiting trees. The seeds are extracted by squeezing them with the fingers from their pulpy covering. They must be planted immediately to obtain a high percentage of germination. In a mature grove there are two kinds of fruiting pimento trees; those commonly called "female"; and the nonfruiting or barren trees generally designated as "male." The so-called male trees occasionally bear small quantities of fruit. Some of the flowers of such trees are structurally hermaphroditic, and the species is said to be polygamo-dioecious. The fruitful and unfruitful allspice trees are so similar in appearance that the fertile trees usually cannot be determined until after flowering. Under favorable conditions the allspice tree begins to bear at the age of seven or eight years but is not in full bearing until the 15th year. It may then bear for one hundred or more years. Jamaican production statistics for trees of all ages indicate an average yield of about 2½ pounds of dried pimento berries per tree.

Long before the Spaniards arrived in Central America, the Mayan Indians used allspice berries to embalm and help preserve the bodies of important leaders. From the seventeenth through the nineteenth centuries the berries were commonly used aboard ship to preserve meat during long voyages. This custom still exists in Scandinavia, where the berries are used to preserve fish in barrels en route from outlying fishing areas to the coastal markets of Norway, Finland, and Sweden.

Pimento is an aromatic stimulant and carminative to the gastro-intestinal tract, resembling cloves in its action. It is employed as an addition to tonics and purgatives and as a flavoring agent. The chief use is as a spice and condiment and is sometimes employed in perfuming soaps.

Gift Shop Blooms



BOTANIC GARDENS Gift Shop has blossomed into full flower in its permanent setting, the entire south room of the Conservatory complex. In little more than six years it has developed from a struggling seedling into a significant flower.

Shortly after the Associates of Denver Botanic Gardens was organized in September 1964 this fledgling service group opened a gift shop in the foyer of Botanic Gardens House. A borrowed glass enclosed display case (6 feet long) housed the entire operation. Soon a peg board was installed behind the case to hold a few books and small



wreaths. A Silver Tea in early December brought a sprinkling of silver, welcomed membership in both the Gardens and the Associates and announced the opening of the Shop. Craft items — candle-rings, decorated match boxes, bookmarks of pressed flowers, several winter arrangements and a few handmade ornaments were part of that sale. Crafts from natural materials required a minimum of expenditure but maximum talent and originality. These items earned the first dollars to establish an inventory.

Planners agreed that gifts offered for sale should relate to horticulture or nature, in keeping with the Shop's botanical setting. Books, handcrafts and

floral arts (containers, mechanics and accessories) were the three classes of merchandise to be handled in the shop. A $500 loan to enlarge the meager inventory was repaid to the Board of Trustees within the year. Since then the Gift Shop has been self-sustaining.

The book department's first offerings were publications of Denver Botanic Gardens: M. Walter Pesman's *Meet the Natives* and *What Tree Is This?* by Charlotte Barbour and Earl Sinnamon. The Associates' first publications, Coloring Books by Suzanne Ash, George Kelly's *Good Gardens in the Sunshine States,* publications by the Denver Museum of Natural History and a few books on floral arts comprised the listings.

From the beginning handcrafted items gave the Gift Shop a distinctive personality. Many were keyed to the seasons. Basic year-round items included the pressed flower bookmarks, more decorated match boxes and the nut figures, a project of Around the Seasons Club.

With the opening of Boettcher Memorial Conservatory the Shop moved into a nook in the lobby of this new facility. Display space there was limited, however, and soon the borrowed case was reactivated. As inventories increased sales soared. Profits bought more merchandise. In May 1968 the Shop moved into the east portion of the south room. Bookshelves were added to enable visitors to browse among the 125 titles stocked there. Stationery, jewelry, statuary and figurines were shown to advantage in lighted display cases.

Closing off the main entrance during construction of the Education Building prompted another move, this time into the west portion of the south room. The Gift Shop Committee's theory that books almost sell themselves when accessible to visitors proved true and additional bookcases were built. Now the book inventory includes more than 350 titles on ornamental horticulture, ecology, flower arranging, birds, trees, houseplants and related subjects. They range in scope from children's books to college texts on wildflower identification. Books account for one-fourth of total sales. Last spring an autograph party honored Ruth Nelson and Dorothy Leake, author and illustrator of *Handbook of Rocky Mountain Plants*. Ann Zwinger, nationally prominent for her recent volume, *Beyond the Aspen Grove,* will autograph here the afternoon of March 25. The book department has contributed invaluably to the prestige of the Shop.

Annual plant sales and pre-Christmas sales give special impetus to Gift Shop activities. Associates, friends, members and employees of the Gardens patronize the Shop regularly. Tourists and convention delegates as well as visitors on city tour buses also contribute to the Shop's success. Mail orders have been received from such distant places as South America, England, and Hawaii.

Last year 38 volunteers gave more than 6,000 hours to staff the Shop seven days a week. A committee of six approves purchases of merchandise. Garden hand tools, floral art supplies, aspen leaf jewelry and Navajo juniper berry beads, exotic containers and figurines, imported treasures, herbs and the recent *Herb Chart Bookmark,* fragrant sachets, potpourris and candles have all become an integral part of a gift shop that is naturally oriented toward nature.

Craft workshops at the Gardens and in members' homes continue to produce original gifts — artistic wall hangings, table arrangements, pressed flower

pictures and bookmarks, candle-rings and whimsical figures. Last year these crafts, including *A Pinch of Herbs* prepared by Tussie Mussie Mesdames, brought $5,000 in profits.

A gift from the Gardens is indeed a gift to the Gardens. During the years Associates have donated a 1½-ton truck, given $2,500 toward purchase of a tractor, contributed $5,000 for books and/or furniture for the Helen Fowler Library in the new Education Building, furnished permanent labels for plants in the Conservatory and provided numerous other necessities. Gifts during the past year were a labeling machine, $6,000 in educational equipment for the new building and $1,000 for special plants in the Conservatory. A $5,000 donation was also made to the General Fund.

Plan to visit Botanic Gardens Gift Shop, newly transplanted into a uniquely beautiful container — the jewel-like south room at 1005 York Street.

Come, let's continue to grow together. B.E.P.

Will you be in the picture this year??





Annual Plant Sale

May 7 and 8, 9:30 to 5:30

COME GROW WITH US!!

AFRICAN VIOLET PROPAGATION PRIMER

EMMA LAHR

IF YOU'VE NEVER had any luck growing African violets, follow these simple directions. Plants which are propagated in the same environment in which they will live often do better.

Choose a medium size leaf which looks healthy. The very large lower leaves of a mature plant often take longer to root, though they will produce plantlets in time. A short stem roots more quickly than a long stem. Using a sharp edged knife or a razor blade, make a diagonal cut leaving one inch of stem above the cut, with the shorter length at the front of the leaf. Figure 1. The diagonal cut gives a greater rooting surface, and also the small plantlets will come up in front of the leaf instead of hiding beneath it.

For a rooting medium use half vermiculite and half loose potting soil with chip charcoal added. As is true of most cuttings, roots formed in water have a different cell structure than those roots formed in soil. Water roots cannot be used by a cutting when

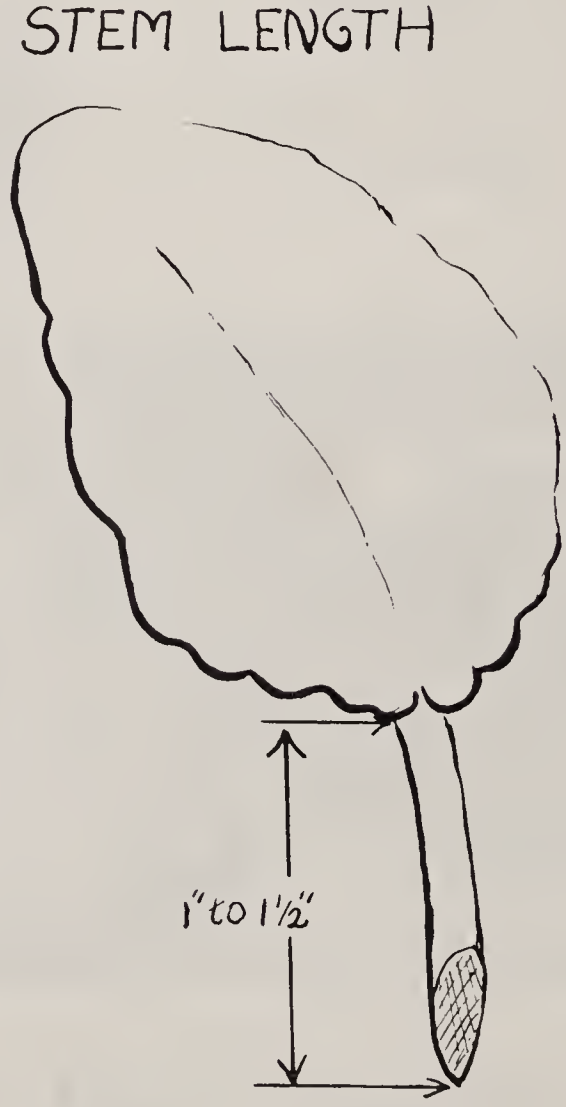
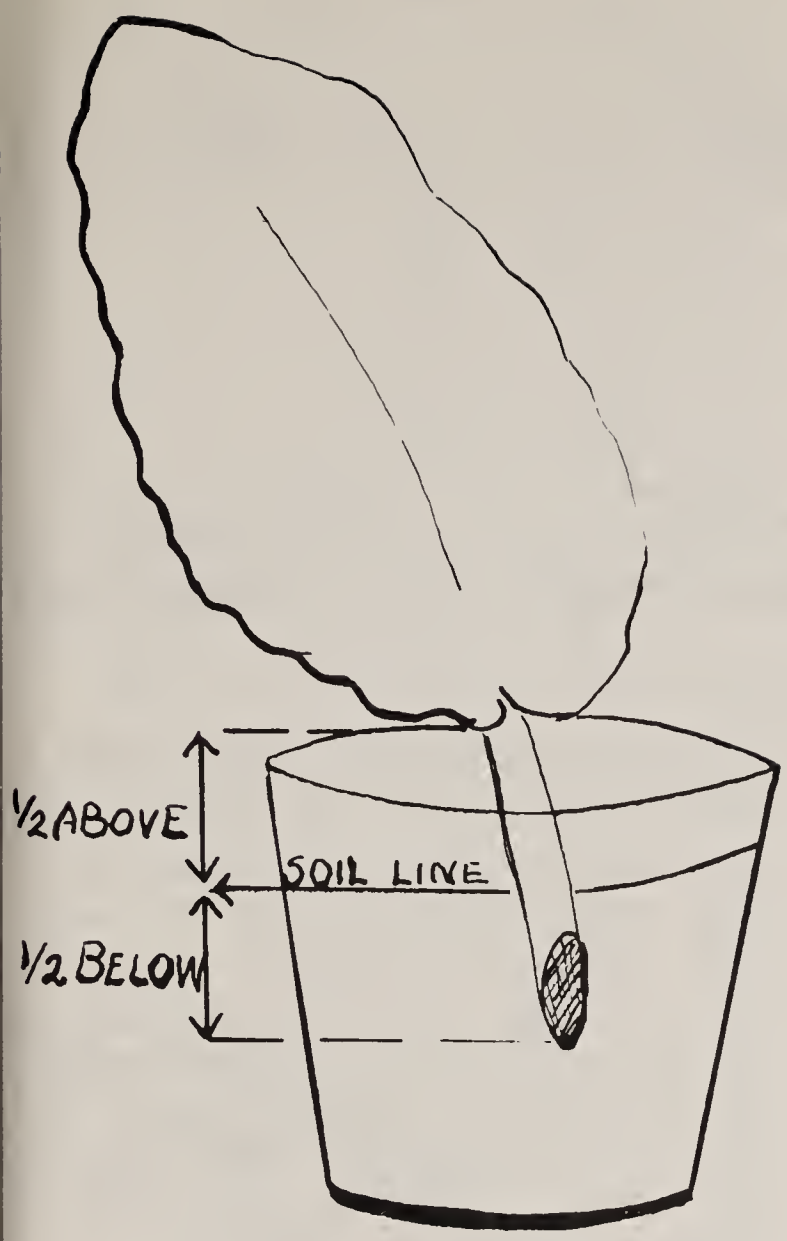


Fig. 1



PLACE IN ROOTING MEDIUM

Fig. 2

placed in soil; instead, the cutting must grow new roots which nature designed to take sustenance from the soil. Place the leaf in the rooting medium with half the length of the stem above the soil and half below. Figure 2. Write the name of the variety on a marking stick and place the stick so it holds the leaf upright. The small pot containing the leaf may be set in or covered with a small plastic bag for the first four weeks. The added humidity of this small greenhouse keeps the leaf healthy and hastens the development of the roots. Give the leaf the same light, water and care as that required by a plant. The leaf will root in three to four weeks; the small plantlets will appear in six weeks to six months. A leaf will produce from one to twenty or more plantlets.

When there are two pairs of leaves on the small plantlets and the leaves look healthy enough to sustain the plant the mother leaf may be gently pulled from the root ball which has formed, or the mother leaf may be broken off at soil level. Figure 3. The roots may be left on the mother leaf or a new cut may be made by removing the old roots. It may be set to raise another family. It is quite all right to leave the mother leaf with the small plantlets sometimes it will wither and die, sometimes it will still be strong and healthy and may be put to root again when the small plantlets are sepa-



Fig. 3



Fig. 4

rated and placed in pots of their own.

When the leaves of the small plantlets are the size of a quarter, or when there are three pairs of leaves, the plantlets may be gently pulled apart and each set in its own pot, using a loose porous potting soil. Figure 4. Be sure that the plant is in the center of the pot, that the crown of the plant is above soil level, and that the soil remains about one-half inch from the top of the pot to give watering room. Tamp the soil gently but firmly to remove unnecessary air. When using clay pots, before potting, cover the edge with aluminum foil. This prevents leaves or leaf stems from contacting any salt accumulation in this area and thus minimizing probable stem rot. A small plant requires a small pot; a 2½″ pot is a good size for a baby plant.

WORMS THAT WORRY YOU

Wes Woodward

You can tell spring is coming by the popping of poppies from the wet ground, by the purple blossoming of periwinkle, by the sudden unfolding of chromatic crocus. But spring is really here when you walk under the cherry tree and come face to face with a little green caterpillar hanging on a filmy white strand.

The leaf rollers have come!

These wiggly worms become more plentiful and pestiferous each year. In some gardens they destroy the leaves of trees and roses and almost everything else in their downward path. They have passed crab grass, slugs, mildew, hail and chinese elm sprouts in the race to become the greatest pest of all. The trouble is, you can't get at them. You don't even know they are there until you see the curled up leaves and they have already armed themselves against your sprays. The first encounter with leaf rollers is probably too late.

After several seasons of futile battle against these marauders — you can squeeze the rolled leaves and make a mess — I went to the books by experts to find out who my enemy was.



The new Bulletin 472A, called "Insect Pests of Landscape Plants," issued by Cooperative Extension Service of Colorado State University in June 1970, says that there are several species, two of which we can expect to meet under the cherry tree. There's the fruit tree leaf roller — *Archips argyrospilus,* and the oblique-banded leaf roller — *Choristoneura rosaceana,* which look alike and are equally destructive. They are the larvae of ¾ inch brown moths that don't bother much, once they have reached that stage.

The books says you spray them — with Methoxychlor, Lindane, Sevin, Diazinon, Malathion or Dieldrin. It doesn't say whether the spray will penetrate the rolled up leaves. However, one rose expert contends that if the spray can be broken up into a fine mist and applied with force — he had a gadget to do this — it will reach the caterpillars. I've sprayed with a garden hose attachment. Maybe I cut down the caterpillar crop from ten thousand to seven thousand.

Metcalf and Flint, in "Destructive and Useful Insects" say that most effective control is obtained by thoroughly spraying dormant trees, on the warm days of February and March, with good commercial miscible oil or oil emulsion. What you are trying to hit, and to cover, are the masses of eggs, from 30 to 100 in a patch, plastered on the twigs and branches, coated with a brownish gray varnish-like material and blending perfectly with the bark. You probably can't see the eggs but you may, if you're thorough, cover them so that they won't hatch. If you cover them you've got them; there's only one generation a year.

ikebana

ELIZABETH WEAR

BASED ON THE teachings of Confucius and incorporating the three symbolic elements of heaven, man and earth, ikebana — the art of Japanese flower arranging — has created an international artistic link among people all over the world.

Ikebana is at once more subtle, more sensitive, and more sophisticated than the usual Western methods of arranging flowers. One reason is simply that ikebana is an art, in the same sense that painting and sculpture are. It has a recorded history it has undergone a coherent development; it has a technical discipline; it is backed up by articulate theories; and it is concerned with creativity.

The Japanese have an age-old tendency to associate a wide range of human emotions with flowers. In classical Japanese poetry, the very mention of a flower's name is often enough to evoke a whole series of ideas, images and meanings. A cherry blossom is not merely a beautiful flower, it is also a symbol of manliness and bravery. It blossoms briefly but gloriously, then falls quickly before it has withered. The grasses of autumn suggest the wanness of fading summer and the sadness of growing old. To the great majority of Japanese, each flower also evokes a particular month of the year and the feeling or mood appropriate to that month. Thus each Japanese flower arrangement is very meaningful, symbolizing the link between man



and nature and representing a mood appropriate to the particular season and even the particular occasion.

The original chapter of Ikebana International, an organization devoted to the study of Japanese flower arranging, was founded in Tokyo in 1956 by an American military wife.

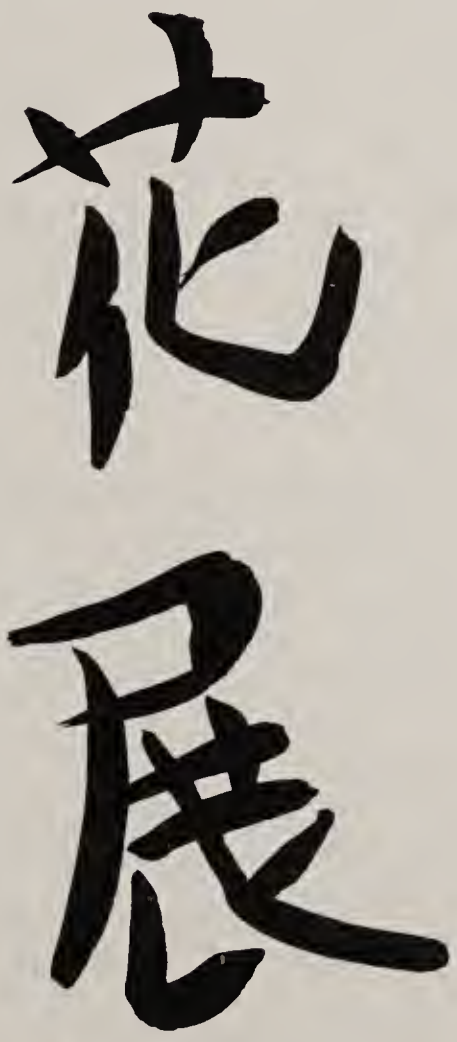
Denver's chapter was established in 1962 and is one of 140 such organizations located throughout the world with over 10,000 members. The clubs are linked by the motto: "Friendship Through Flowers."



Members of Ikebana International clubs can qualify for various flower arranging degrees through their own teachers. The degrees, nine in all, progress in Japanese style with ninth lowest and the first as highest.

The Denver chapter is preparing for its sixth exhibit of flower arrangements, an annual event for Ikebana chapters everywhere. A $1.00 donation is requested for admission. Proceeds from the show will be given to the Denver Botanic Gardens.

Chairman of the show is Mrs. Baxter Lanius. Assisting her are Mrs. M. M. Magruder, Mrs. Robert M. Stanley, Mrs. James J. Waring, and Mrs. William J. Burkhardt. Advisors are Mrs. Alonzo Lilly and Mrs. Frank McLister. Anyone interested in further information should call the club's president, Mrs. John F. Wear.



Saturday and Sunday

10 a.m. to 5 p.m.

April 24 and 25

Education Building

Denver Botanic Gardens

LECTURE SERIES 1971

The Education Committee of the Denver Botanic Gardens wishes to announce its series of free lectures for the winter and spring of 1971. These lectures will be held in Horticulture Hall in the new Education Building at 1005 York St. They begin at 8:00 P.M., and free parking is provided just to the east between York Street and Josephine Street.

The lecturers are all well recognized in the plant field and their talks will be of interest both to professionals as well as lay plantsmen. The audience is invited to participate in the question and answer period which follows each talk.

JANUARY 21, 1971 THURSDAY

Is there a Botanic Garden in your Future?
Civilized men have been building botanic gardens throughout recorded history. Why has this been so? Are they institutions with any "relevancy" today? What can they contribute to bewildered men and society in our times?

Dr. Wm. Gambill, Director of the Denver Botanic Gardens.

FEBRUARY 18, 1971 THURSDAY

Flowering Trees of the Tropics.
This region of the world contains more species and the flowers are larger and more attractive than those of the temperate zone. The talk will be illustrated with color slides.

F. L. S. O'Rourke, Professor of Horticulture, Colorado State University.

MARCH 18, 1971 THURSDAY

Colorado Wildflowers and Flower Interlude.
The program is in stereo with musical background dwelling on blooming cycles in the five plant life zones.

Vernon and Lucille Tomppert, well-known photographers of nature subjects.

APRIL 22, 1971 THURSDAY

Response of Varieties of Woody Plants (Including Aspen) to Environmental Conditions.
How do plants react to changes in water conditions, intensity of light, biological conditions and temperature? The talk will be illustrated with slides.

Dr. George Williams, Department of Biological Sciences, University of Denver.

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The Green Thumb

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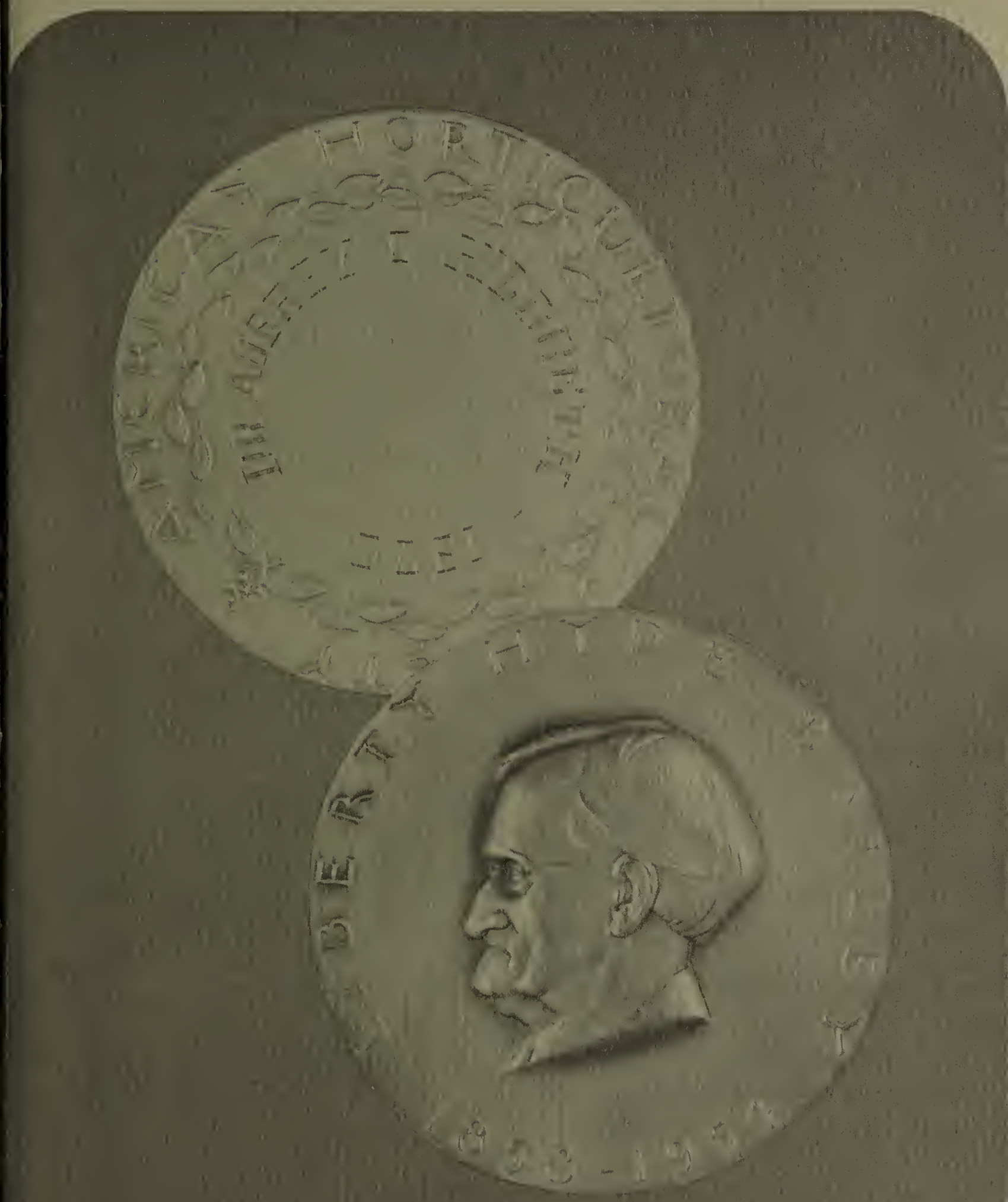
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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SPRING 1971



THE COVER

Liberty Hyde Bailey award presented to Dr. A.C. Hildreth November 4, 1970.

Photos by Robert W. Schott.

Arrangement by Phil Hayward.

THE GREEN THUMB

VOL. TWENTY-EIGHT, NUMBER TWO

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MARGARET SIKES,
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SPRING 1971

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in Boettcher Memorial Center at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

BOETTCHER MEMORIAL CENTER RIBBON CUTTING

MARCH 6, 1971

Remarks by Cris Dobbins,
Board Chairman of Boettcher Foundation*

"Accuse not nature, she has done her part; Do thou but thine!" Certainly nature did her part yesterday in the surprise snowstorm and fierce blizzard. How great it is to be in Colorado and in Denver where after a miserable day of blowing snow yesterday we have a beautiful blue sky and bright sunshine this morning!

This is a happy occasion. It marks the culmination of thought, planning and hard work extending over a long period of time. It is a special pleasure for me as Chairman and on behalf of the Trustees of the Boettcher Foundation to participate in this ceremony. The outline I received stated that I would make presentation of the new building and completed Boettcher Memorial Center to the City and County of Denver. That is an oversimplified statement of course.

Actually the interest of our Foundation . . . goes back to Claude K. Boettcher and his father Charles, who brought the Foundation into being in 1937 as a charitable institution whose beneficences under its charter were and still are confined to the State of Colorado.

Both of the founding Boettchers had a great love for the State of Colorado, which had been good to them. Both of them traveled extensively throughout their lifetimes and, of course, could have lived anywhere, but they all chose to keep their homes and official residence here. They contributed greatly to the growth of the early economy of the State in the fields of cattle and ranching, agriculture, industry and finance.

It was their hope that through the Boettcher Foundation constructive use of their wealth could be devoted within the State to educational, charitable, scientific and cultural purposes, and the present Board of Trustees is dedicated to achieving these objectives.

Members of the present Board are Mrs. Charles Boettcher, II, Judge Hatfield Chilson, C. B. Flick, Walter K. Koch, Hudson Moore, Jr., E. Warren Willard and, of course, myself. Another equally important one of our group, while not a Trustee, is our Vice President and Executive Director, John C. Mitchell.

Both the Senior Charles Boettcher and his son Claude K. Boettcher were interested in the city parks in Denver, as well as our mountain parks and in visiting gardens and conservatories at home and abroad. They had urged and offered to pay for certain arboretum and conservatory projects for the City of Denver, none of which materialized.

It was only natural with that background, as the Botanic Gardens began to take shape that our Trustees took a keen interest in this venture. After a good deal of study and discussion with the Trustees of the Botanic Gardens and officials of the City of Denver, the Boettcher Foundation made a grant of $1 million to build the conservatory structure. In pre-

paring the concept and plans which were produced by Architects Hornbein and White, it appeared that there was need also for a horticulture hall and auditorium as part of the over-all design. The cost of the conservatory building itself was $944,000, and our Trustees decided to leave the $56,000 remaining out of the $1 million grant as "seed money," which would hopefully attract other contributions for completion of the over-all concept. Ground was broken on January 4, 1964, for the conservatory building, which was completed and dedicated in January of 1966. Thereafter a fund-raising drive was started to complete this part of the building complex and there were many contributions, some quite substantial. It became apparent, however, that the amount was falling far short of that needed for the completion of both the building complex and the reconstruction of the Gardens, which together were estimated to cost $850,000. Our Trustees decided to make an additional grant of $500,000, which with the $56,000 from the conservatory grant amounted to $556,000 for the Horticulture Hall Building and $1,500,000 from Boettcher Foundation to the Botanic Gardens to date. It was hoped that this would cover the cost of the buildings and give a good lift at least toward the reconstruction of the Gardens.

Since today marks the completion of the complex, I am happy on behalf of the Boettcher Foundation to make this symbolic presentation of the new building and of the whole building complex, which the Board of the Botanic Gardens has named "The Boettcher Memorial Center" to the City and County of Denver. Of course, all of us should also give recognition to those many others who have contributed of their time, talent and money to this greatly worthwhile undertaking. When the Gardens are completed and these buildings are put into full use, Denver will have one of the finest facilities of its kind anywhere.

*Ed. Note: Mr. Dobbins' comments are recorded here in order that members of Denver Botanic Gardens may share in the activities of this historically significant event.



Bill McNichols, Mayor; Cris Dobbins, Board Chairman, Boettcher Foundation; and John C. Mitchell, President, Denver Botanic Gardens Board of Trustees; cut ribbons as Mr. Dobbins sybolically presents Boettcher Memorial Center to the City and County of Denver.



Directions for Growing Colorado Columbines

(*Aquilegia caerula* James)

Jess Fults*

Starting seedlings

Three different media may be used. The *best* is milled and screened *sphagnum moss. Nearly as good* is Jiffy Mix which contains equal parts shredded *sphagnum peat moss* and fine grade terra-lite-zonolite-vermiculite plus just enough nutrients to sustain initial plant growth (up to 10 weeks). This is a product of the Jiffy Pot Company, and is available from Ball Seed Company. *A third choice* is a greenhouse soil mixture of 1/3 sharp sand, 1/3 screened peat moss and 1/3 clay loam soil with a pH of not over 7.5. If this mixture is used, it should be mixed by volume and then steam pasturized for 24 hours and allowed to cool. Before use it should be aged at least 30 days and thoroughly aerated. *Do not use freshly pasturized greenhouse soil mix*. It is often highly toxic to germinating columbine seeds.

Seed should be planted in 3-inch deep flats in 1-inch rows. It should be spaced 1/8 inch apart and planted ¼ inch deep. Rows can be made with a press-board to which are fastened 3/16 inch dowel strips to mark the rows. The seed should be

*Weed Research Laboratory, Botany and Plant Pathology Department, Colorado State University.

covered with planting medium ¼ inch deep. The surface should then be firmed with a *flat* press board. Flats should then be watered and covered with clear plastic sheeting until germination takes place, then removed.

Initial watering, and until germination occurs, is best done with a fog-nozzle (Fogg-it Company). Each head contains 3 nozzles with holes 1mm in diameter. It is attached directly to a hose. Best fogging is secured with full water pressure. After seedlings emerge an ordinary rose-spray nozzle can be used.

Germination takes 21 to 28 days. Seedlings emerge with two smooth-margined cotyledonary leaves. Approximately 40 days from planting, the first true leaf appears. At about 45 days, seedlings should be transplanted either to 2¼" x 2¼" or 3" x 3" jiffy pots or to 3-inch clay pots—1 plant per pot. Media should be either Jiffy Mix or greenhouse soil. For maximum seedling growth, illuminate with grow-lux fluorescent lights and reflectors set 18 inches above the seedlings at least an extra 5 hours per day during February and March. When seedlings are 12 to 14 weeks old they are ready for transplanting to where they are to be grown. Space 18 inches apart for mass plantings; space 36 inches apart for maximum flower production.

Seed should be planted January 1 to 15. Transplants should be set out between April 15 and May 1 for best growth during the first year. They may be planted as late as June 1 but early plantings under cool early spring conditions produce best first year plants. Some may flower the first year.

Pests

Mildew, aphids, mites, and mosaic virus are the worst enemies of columbines. Aphids and mites are best controlled by use of a soil-incorporated, dry, granular, systemic insecticide. The chemical name is O-O, diethyl S-2-(ethyl thio) ethyl phosphoro dithioate. Trade names include *Scope, Isotox Systemic Granules*, and *Di-System* [O-O-diethyl S-2-(ethyl-thio) ethyl phosphorodithioate]. These may be safely used according to manufactures' directions *after* plants are well established beginning in the early spring of the second growing season. They probably should not be used on new seedling transplants.

If a systemic insecticide is not used, mites may be controlled by use of *Kelthane* [1-1,bis(chlorophenyl),2-2-2 trichloro ethanol] used at 1 teaspoon per gallon water several times at 10-day intervals. Aphids, which attack flowers when they are in the early bud stage may be kept under control with nicotine sulfate (*Black Leaf 40*) used with soapy water at a rate of 1 teaspoon per gallon. Don't mix Kelthane and Black Leaf 40.

Mosaic virus which appears during the second year causing chlorotic leaves and misshaped flowers and which persists indefinitely in affected plants can be brought under reasonable control by digging and destroying affected plants as soon as they appear. If affected plants are not destroyed, the mosaic may spread to all plants in the planting.

Mildew can be very serious on established plants beginning in midsummer of the second year after planting. It is worst during hot, dry weather and can almost completely defoliate plants. It can be minimized in its attack by use of *Karathane* [di-nitro (1-methyl heptyl) phenyl crotonate] used at weekly intervals at a rate of 3/4 teaspoons per gallon of water beginning at the first sign of the white mildew powder on the older leaves in conjunction with adequate irrigation and nutrition.

Expected length of life of established plants

About 50 percent of original plants can be expected to live five years or more. However, after the second year plants drop large amounts of viable seed which produce many volunteer seedlings the third year. This often results in maintenance of a full population of plants but flower colors are almost certain to be different than the original plants. This partly explains why many growers who sometimes transplant wild blue-white types find that the colors change after two or three years. In this process, the blue-white types decrease or disappear.

BOOK REVIEW

INGENIOUS KINGDOM: The Remarkable World of Plants, Henry and Rebecca Northen, Prentice-Hall, Inc., Englewood Cliffs, N.J., October 1970.

This book is the latest in the Prentice-Hall series in nature and natural history.

The authors are by no means strangers to many *Green Thumb* readers. Dr. Henry Northen is professor of botany at the University of Wyoming, and is the author of *Introductory Plant Science.* Rebecca Northen is an orchid specialist who has written two books on orchids: *Home Orchid Growing* and *Orchids as House Plants.* The Northens are co-authors of *The Secret of the Green Thumb* and *The Complete Book of Greenhouse Gardening.*

The Ingenious Kingdom, as a part of a popular series in nature and natural history, is directed toward the person interested in plants but lacking technical training.

To write such a book is difficult; one must neither oversimplify nor talk over the head of the reader. A tremendous variety and bulk of material must be touched upon in a limited number of pages. The Northens, experienced writers, have met the challenge of this monumental task very well.

The book begins with a chapter on the origin and conditions for life on earth; continues with brief glimpses at all the major plant groups; touches on structure and physiology, including a chapter on plant hormones and another on plant calendars and clocks. Adaptations to environment and an introduction to the major ecological formations of the world are included. Basic botanical information, ecology (with interactions of plants and animals) and conservation are all a part of the book.

Obviously a book of such broad scope cannot be all-inclusive and there must of necessity be generalizations. Nevertheless, a surprising amount of good information, sometimes in detail, is written in a very readable manner. The portion on pollination in the chapter on flowering plants is a good example of this.

The book is well-illustrated with a variety of good photographs. Among these might be mentioned photographs of pollen grains and an X-ray photograph of flowering dogwood (*Cornus florida* L.). The artistic drawings are attractive but do not add to the book's value for the person wishing to increase his knowledge of plants.

Helen Marsh Zeiner



THE SEASON OF FLOWERS

Katharine Bruderlin Crisp*

"Spring, spring, spring of the year," I heard the robin sing today, yet by the calendar spring is still three weeks away. Patches of green grass peeping through the snow, buds swelling on the maples and elms, all announce that soon the season of flowers will be here.

Now the longing to go in search of the first easter daisy, to spot the first white sand lily or the first yellow johnny jump-up is upon us. I know that on the warm hillsides the spring beauty is peeping through the leaf mold, the blue pasque flower with its furry collar has arrived prepared to weather the chilly breeze, and the oregon grape is making bright yellow patches that hug tightly the lichen covered rocks. April is here and the season of flowers has begun.

Gradually, one by one, or in groups, our friends return until by the first week in June the landscape is ablaze with color. Then we fully realize that here in Colorado with her blue skies, bright sunshine and stimulating atmosphere is the real land of flowers. Masses of color, all about make us gasp with delight. Here, there are patches of chickweed, white as the driven snow, there patches of golden yellow wallflowers. Close at our feet is the delicate blue flax, and farther away blue mertensia, pink gilia and purple larkspur are nodding in the breeze. Over yonder a bright red spot calls our attention to the paint brush.

To the botanist, Colorado offers an unlimited field for study; to the nature lover a paradise in which to revel. Even the mere tourist cannot go away without carrying a very definite impression of our wild flower garden. A greater variety of flowers is found here than in any other state in the Union with the exception of

*Mrs. Crisp is a native Coloradan and one of our early naturalists. The accompanying article appeared in *Municipal Facts,* March-April 1926 and is found in the Western History room at the Denver Public Library. The Green Thumb Editorial Committee feels the material is as appropriate for its readers now as it was 45 years ago despite the "encroachment of civilization."

the states of California and Texas. Telescoped into the space between the plains and the arctic alpine zone on the highest mountain peaks is a vegetation such as one might find in a much longer journey from northern Mexico to Labrador.

Starting out on a gorgeous June morning for a day's hike in the foothills of the Mountain Parks near Denver, the interested person can hope to find with ease from one hundred to one hundred seventy-five varieties of flowers in bloom.

Let us consider first, a few of the white flowers. The chickweed belonging to the pink family, is low, never more than ten inches tall. The pretty, starry white flowers measuring about half an inch across are quite conspicuous. All during the month of June, the chickweed forms white masses on the hillsides.

Looking out across the plains, we see along the roadside other patches of white. On a closer investigation we recognize the prickly poppy and the snow-on-the-mountain. The prickly poppy is a large handsome white flower, at least four inches across, with a yellow center. The leaves as the name implies, bear prickles, and the stem when broken yields a yellow sap. The snow-on-the-mountain is characterized by its unusual leaves. The flowers are small and inconspicuous, but below them are located foliage leaves bordered in white. This gives the whole plant a whitish aspect.

Another flower of the plains is the evening primrose. The flowers are often three inches across bearing four heart-shaped petals. The pale green foliage, reddish buds, white flowers and faded crimson ones produce a fine color scheme.

Perhaps one of the loveliest, if not the loveliest, of the pale flowers is the mariposa lily. This grows on the dry open hillsides. The leaves are grass-like, the



flowers tulip shaped. Mariposa, which means "butterfly" in Spanish, is an appropriate name for the flower. With its purplish black center it looks like a butterfly that has just alighted on the slender stem.

Another member of the lily family is the yucca, or Spanish bayonet. The plants are large, bearing long daggerlike leaves. The flowers, cream colored, about two inches across are borne close together on tall spikes which often reach a height of three feet.

There are many flowers of bluish tint. Among these we find the columbine, pasque flower, mertensia, larkspur, harebell, flax, lupine, skull cap, penstemon and spider lily.

The state flower of Colorado is the blue columbine, belonging to the crowfoot family. The flower, often three inches across, has five blue sepals resembling petals and five whitish petals with conspicuous hollow spurs. Other members of this family are the purple larkspur and the blue pasque flower. The latter is often called the "anemone."

The mertensia, commonly called lungwort, bears graceful clusters of nodding blue flowers.

The harebell is a true bluebell. The plant grows from six inches to a foot in height. The flowers are less than an inch

long, deep blue in color, and hang from thread-like stems in a loose cluster.

The lupine forms large clumps bearing spikes of pea-shaped flowers. It may be easily recognized by its compound leaf.

The wild rose, beloved not only for its beautiful pink color, but also for its lovely fragrance, needs no description. The gilia and wild geranium, are other pink flowers. The monarda, or horse mint, not a very positive flower when found alone, forms beautiful patches of reddish-purple when growing in masses.

The mountain, or wood lily, now very rare near Denver, loves the shelter of the aspen groves. This fiery-red lily resembles the common tiger lily. Together with the columbine, this flower needs our most careful protection in order to prevent extermination.

The season begins with yellow. The oregon grape, the stone crop, the Western wall flower, the thermopsis and the bladder pods, are the first arrivals. Then the composites carry the color through the summer and end the season in a long glory of yellow. The gold of the aspen gradually disappears, and thus ends the glorious season of flowers.





. . . the first snowdrops pierce through the leaf-mulch under the cottonwoods . . .

HAVE YOU VISITED THE GIFT SHOP RECENTLY?
WE'RE BIGGER AND BETTER, WITH MANY GIFTS
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Exotics of Colorado...

Snowdrop, *Galanthus nivalis*

Helen Marsh Zeiner

One of the very earliest flowers of spring, the dainty little snowdrop has been a garden favorite for many years. Known to botanists as *Galanthus nivalis* L., this little bulbous plant is a member of the family *Amaryllidaceae* and therefore related to such familiar flowers as the amaryllis, daffodil, poet's narcissus, paper-white narcissus, and the century plant or agave.

In Denver, snowdrops may bloom as early as the latter part of January. This year on January 28 I saw a beautiful fully-opened snowdrop which had been grown in an Englewood garden. However, it is more usual for snowdrops to bloom during the last half of February or even as late as the first of March. In my south Denver garden, snowdrops were just showing buds on February 15. Exposure, of course, plays an important role in determining the blooming time for snowdrops.

Snowdrops are well named: they are as white as snow, and the solitary nodding flower before it is fully opened looks, to the imaginative person, like a long white drop just ready to fall. Also, snowdrops may appear while the ground is covered with snow, so that they are surrounded by snow or even come poking through the white cover.

In Great Britain, snowdrops are sometimes called fair-maids-of-February, Candlemas bells, or white ladies.

The botanical name, *Galanthus nivalis*, alludes to the whiteness of the flower. *Galanthus* is from the Greek and literally means "milk flower" (gala-milk, anthos-flower). *Nivalis* means snowy or white.

A larger snowdrop known as giant snowdrop, *Galanthus elwesii* Hook., is sometimes grown but is not seen as often as *Galanthus nivalis. Galanthus elwesii* is named for a botanist, Elwes, who collected it near Smyrna.

Each snowdrop flower is borne on a leafless flower stalk or scape and is subtended by papery bracts. The nodding bell-like flowers appear to have three white petals enclosing a green-and-white tube with six tips. If you look at the flower closely, however, you will see that in reality the three white "petals" are sepals or the outer segments of the perianth. The green-and-white "tube" is made up of three inner perianth parts or petals, each with a two-lobed tip. The petals appear as a tube because they overlap slightly, not because they are united.

Members of the amaryllis family are often mistaken for lilies, but they can always be distinguished by the fact that they have an inferior ovary in contrast to the superior ovary of the lily. In other words, because of the place of attachment of perianth parts, the ovary in *Amaryllidaceae* appears below the perianth; in *Liliaceae*, above.

In the snowdrop, the globous inferior ovary appears as a green ball below the white sepals. As the ovary matures, it develops into a somewhat fleshy three-valved capsule.

Each snowdrop puts up two or three dark green strapshaped leaves. They may come with the flowers, but they do not reach their full growth until later. The leaves often die down in mid- or late summer.

The bulbs are easy to establish and the plants soon multiply either from seeds or from offsets. In damp eastern woods they may become naturalized.

Plant the bulbs from two to four inches deep in early fall. Snowdrops like to be moist, cool, and will tolerate some shade. Once established, they need little attention.

Galanthus nivalis is a native of damp woods in England, Wales, central and southern Europe and western Asia. It has been planted in gardens from very early times, and is said to have been grown by the herbalist Gerarde in his garden. On the other hand, *Galanthus elwesii*, native to Asia Minor, was not introduced until 1875. There are about half a dozen natural species of *Galanthus* known.

S. R. deBoer writes about the snowdrop in his book *Around the Seasons.* He says that it is his favorite flower and that he hopes to have it in his garden as long as he lives. You will enjoy reading the chapter "Earliest Flowers" for his discussion of snowdrops and other very early spring flowers. The drawing accompanying this article was made by Frances White Novitt, a member of the editorial committee for *The Green Thumb*, and was taken from this chapter of Mr. deBoer's book. We are grateful to him for permitting us to use this illustration.

OUR NEW EDITOR

With this issue, Margaret Sikes joins the staff of Denver Botanic Gardens as Editor of *The Green Thumb.* Miss Sikes received her B.A. in botany and an M.A. in history from the University of Denver. For the past ten years she has been affiliated with Temple Buell College, serving in a variety of positions. Presently she is enrolled in further academic work in biological sciences.

THE ROCK ELM



S.R. DeBoer

The serious threat to the American elm by an invasion of the Dutch elm disease makes experimentation with new varieties absolutely necessary. Some work along that line was done years ago. The English Elm (*U. campestris*) was planted in the east section of Cheesman Park at Ninth Avenue. It is still there and seems to be healthy. It was planted as a good size tree donated by Al Mauff, a florist. A row of English elm planted on the south side of Third Avenue from Downing to Gilpin has been less successful—many trees have died and all were attacked by elm scale.

Among the many varieties of elms which were tried, the rock elm (*Ulmus thomasii** Sarg), seemed the hardiest. It withstood frosts and because of the corky bark was not subject to elm scale. It, however, is not the true cork elm which has a thick layer of cork over the branches. It proved not to be hardy in the Denver climate.

The rock elm is conical in shape and not drooping like the American. It was planted at various places. Those on University Boulevard from Alameda to Exposition are hardy but the early frost of 1969 has damaged the tops. The trees on the west side were well cared for and suffered less. Those on the east side did not get enough water. They suffered for a long time and were damaged more by the frost. The rock elm around Observatory Park have been fine but have also suffered some damage. Those at Sloans Lake Park along Stuart Street stood up fairly well.

I believe that the rock elm is still one of our most dependable trees and should be planted in an arboretum and be available for replacing the American elms when needed. The Speer Boulevard tree line is perhaps the most outstanding item of beauty in the Denver plan. I hope it can be saved, at any cost. In the meantime Denver should have a place to grow new trees. I have thought that the sixty acres of the State Home might be used that way. It has a water connection from the city ditch.

There are several other varieties of elms which should be tried. They come in all shapes and colors. The drooping elm is a unique variety which is small and fits a small garden. It does however get the elm scale and needs spraying.

**Ulmus racemosa* Thomas, not Borkh.

MOUNTAIN MAPLE MITES

William A. Weber

Along about July of every summer, the mountain maple, *Acer glabrum Torr.*, takes on the aspect of premature autumnal coloration. The leaves become splashed with great blotches of a brilliant red color. That this is not just autumn coloration can be seen by taking a closer look with a hand-lens. The leaf surface seems to be covered by a myriad of minute, inflated crimson globes. Many leaves of the shrub are likely to be affected, and at times there is considerable deformation and curling of the leaves. One might be tempted at first to think this might be some type of rust fungus, or perhaps clusters of tiny spider eggs, except that the red globules have no stalks. Careful dissection, however, shows that these structures contain some of the smallest arthropods known to biology, the eriophyid mites.

It is not easy to find much general information about Colorado eriophyids. In 1927, T.D.A. Cockerell, in his book, *Zoology of Colorado*, wrote, "Trees and shrubs are frequently observed to be apparently diseased, the leaves being blotched or curled, or the ends of the branches distorted. Many years ago it was supposed that these effects were produced by microscopic fungi, but we now know that most of them can be attributed to excessively small elongated mites, peculiar for having only four legs. The mites set up irritation which results in the formation of galls. They constitute a family *Eriophyidae*, which of late years has been intensively studied in Europe, with the result of discovering a vast number of species. No doubt similar discoveries await any student in Colorado who will seriously devote himself to the subject. One of our commonest forms is that which produces the bright red blotches on leaves of mountain maple . . ."

There are only a few specialists on these particular mites in America, even now, notably H. H. Keifer and Norton S. Wilson. Since Cockerell did not give a name for the maple mite, I sent specimens of them to Dr. Wilson, who kindly identified it and furnished some comments, interesting because they serve to emphasize how much work needs to be done on almost any problem in natural history in Colorado.

Cockerell did not give a name for this little mite, probably because there was so little known about them at the time and because he had little or no experience with them. In fact, the species was first named, by Keifer, in 1952. Wilson writes: "At this point, I should state that the taxonomy of the eriophyid mites prior to Keifer's work (which started about 1938) is practically non-existent. Most of the earlier eriophyid papers contain descriptions which are inadequate from the standpoint of our present knowledge of eriophyid anatomy. Many of the species names in these early papers will, I believe, eventually have to be declared invalid.

*Professor of Natural History, University of Colorado Museum

Although there are many references to mites causing erineum on maple leaves, I am basing my identification of the specimens I received from you, on Keifer's papers.

"Characters of these mites agree quite closely with Keifer's *Aceria calaceris*, and I believe you would be safe in using this name. I suspect, however, that these erineum-producing mites on maple will eventually be found to constitute a complex involving three or four different species. Keifer's description of *A. calaceris* is based on specimens from California; however, I have collected mites similar to these on maple leaves in Washington, Oregon, and in the Rocky Mountain National Park in Colorado.

Collecting these interesting mites and their galls can be an interesting, absorbing, and rewarding hobby for someone who likes the outdoors and has a bit of time on his hands. In this way, amateurs can make lasting and productive liasons with specialists who often are far from the local scene "where the action is" and appreciate receiving new and often unknown material.

"From what I have seen of these mites the damage to any individual tree is usually negligible and should be disregarded. In extreme cases, I suppose that one of the thiono-phosphate acaricides could be used but I would not recommend this."

NEW BOOKS IN THE LIBRARY

Leighton, Ann. *Early American Gardens; "for meate or medicine."* Boston, Houghton Mifflin, 1970. $10.00

The intent of this book is to make the gardens of the early settlers of New England grow again—to discover what they grew and how they cultivated their crops for nourishment and medicine.

Garden plans are also explained in detail with good illustrations. A bibliography and an alphabetical appendix of the plants mentioned by explorers, settlers, underwriters and visitors as growing in 17th century New England, native or cultivated, complete this very interesting and well written book.

Tyler, Hamilton. *Organic Gardening Without Poisons.* New York, Van Nostran Reinhold, 1970. $7.50

A complete guide to present day gardening without pesticides from within the ground up. Well illustrated, clear directions, applicable to this area.

Fox, Helen M. *Adventure In My Garden.* New York, Crown, 1965. $2.98

A journal of seasonal gardening activities as experienced by the author at her Westchester County home.

Although Mrs. Fox's garden is in eastern New York, the greenhouse cultivation can be applied to indoor Colorado gardening as well as to the growing of more hardy plants. Also of interest are composting information, color schemes, and the propagation of annuals by division from seed.

Zwinger, Ann. *Beyond The Aspen Grove* with drawings by the author. New York, Random House, 1970. $8.95

Mrs. Zwinger has written a beautiful book. The line drawings complement the simple, poetic prose describing an area close to Colorado Springs. The forty acres of woods, meadows, lakes and streams, their flora and fauna are described, sketched, and the balance of nature throughout the seasons is carefully outlined for our pleasure and instruction.

Editor's Note—*Beyond The Aspen Grove* was reviewed more completely in the Autumn 1970 issue of *The Green Thumb.*



DR. HILDRETH AWARDED THE LIBERTY HYDE BAILEY MEDAL

The American Horticultural Society has awarded the Liberty Hyde Bailey medal to Dr. Aubrey C. Hildreth, Director Emeritus of Denver Botanic Gardens. The presentation was made on November 4, 1970, at the annual meeting of the Society in Miami Beach, Florida. The citation reads, "A pioneer in developing suitable horticultural techniques for the Rocky Mountain States."

The Liberty Hyde Bailey medal is the highest honor that the American Horticultural Society bestows upon an individual. Only one medal is awarded in any calendar year, but it is not necessarily awarded every year. Dr. Hildreth is the twelfth recipient of the medal and the first westerner to be granted this distinction.

This is the second time that he has been honored by this Society. The first was a citation presented October 27, 1961, at Northampton, Massachusetts, in recognition of his research on cold resistance in plants and his observations on fruit and ornamental plants under cold and drought conditions of the Great Plains.

The American Horticultural Society was founded in 1922 at Washington, D.C. In June of 1926, it merged with a somewhat older organization, The National Horticultural Society. The name "American Horticultural Society" was retained for the expanded organization.

In 1960 there was another merger, this time with the American Horticultural Council. Again the name "American Hor-

Please insert this
corrected copy
for pages 48 and 49
into your
Spring 1971 Issue



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In 1960 there was another merger, this time with the American Horticultural Council. Again the name "American Hor-

ticultural Society" was retained and some of the activities of the discontinued Council were adopted by the re-incorporated Society.

One such activity was the awarding of the Liberty Hyde Bailey medal, which was initiated by the American Horticultural Council in 1958, when the first medal was presented to Dr. John C. Wister of Swarthmore, Pennsylvania. Since the 1960 merger the American Horticultural Society has awarded this medal annually, except the year 1961, when no award was made.





TALL SHRUBS FOR DRY LAND GARDENS

A.C. Hildreth

General principles of gardening on the semi-arid plains, without irrigation, were presented in the Autumn 1969 issue of *The Green Thumb.* A later article* treated tree culture under dry land conditions. In this article, drought-tolerant tall shrubs for dry land gardens will be discussed.

Every gardener can tell his trees from his shrubs. Yet the technical distinctions are as difficult to define as are the words "tree" and "shrub" themselves. Although certain differences involving size, form and growth habit distinguish trees from shrubs in most cases, there are many frustrating exceptions.

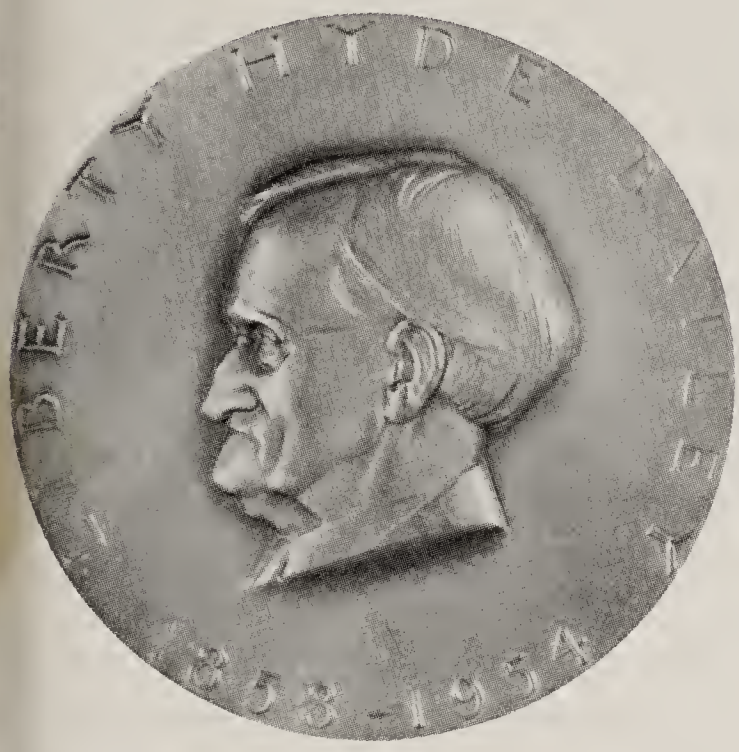
The usual concept of a tree is a tall woody plant with a single stem or trunk, and in horticultural literature a tree is often so defined. The general concept of a shrub is a woody plant of somewhat less than tree size, which develops several stems or trunks from the base.

But how does one classify the popular multi-trunked trees, the banyan tree or a tall shrub trimmed to a single trunk? And what can be said of dwarfed timberline trees or of tall shrubs that reach a height about equal to that of well-known small

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trees? Botanists often dodge this height question simply by designating all woody plants near the borderline between trees and shrubs as "tall shrubs or small trees."

Straightening out semantic difficulties is beyond the scope of this discussion. As we have seen, the words "tree" and "shrub" are not very definitive. Nevertheless, they serve a useful purpose in the everyday language of horticulture.

The article on dry land tree culture emphasized that there is no truly drought-tolerant tree which is sufficiently cold-hardy to survive western plains winters. At best, plains dry gardeners must get along with trees that are only moderately drought-tolerant. Fortunately, with shrubs the situation is quite different. There are many shrubs that are both drought-tolerant and cold-tolerant.

Indeed, shrubs are the most cosmopolitan of all plant forms. They occur naturally from the torrid to the frigid zones, from the seashore to well above timberline in high mountains, from deserts to swamps, in acid peat bogs and in highly alkaline and saline soils. Shrubs range in height from miniature plants to almost tree-size specimens.

With their wide natural distribution and their adaptation to so many climates and soils, it is not surprising that shrubs have been found which are suitable for dry land gardens on the semi-arid plains.

Although plenty of thoroughly drought-tolerant shrubs are available for dry land plantings, a high degree of either drought-tolerance or cold-tolerance is not so important in shrubs as in trees. A dry land tree which kills to the ground occasionally never actually becomes a tree.

On the other hand, certain kinds of shrubs which are killed back now and then, make satisfactory ornamentals for dry land gardens. This is particularly true of low and medium height shrubs. Their occasional killing to the ground serves as a rejuvenation pruning and new tops soon develop.

Other shrubs, not thoroughly cold- or drought-tolerant frequently have their branches killed back part way. This usually has about the same effect as a moderate pruning. Ironically, such injury (after the dead wood is cut off) may improve the appearance of shrubs, especially of those which bloom on wood growth of the current year.

In this article the term "tall shrub" is arbitrarily defined as a woody plant of bushy habit which may be expected to reach a height of more than six feet under dry land conditions on the semi-arid plains.

Dry land gardeners find several uses for tall shrubs. They make good screens for hiding unsightly objects, for cutting off objectionable views and for secluding private areas from the public gaze.

Grown in hedge form, either clipped or informal, tall shrubs substitute for fences and walls. Such hedges mark property lines, divide grounds into different areas and prevent intrusion by the general public, neighborhood children and stray dogs. Such protective plantings will be more effective if thorny species are selected.

Tall shrubs make excellent windbreaks for sheltering small areas from wind. Properly located, such windbreaks also prevent snowdrifts on walks and driveways.

In a screen or protective planting the shrubs are set in a row and spaced closer together than in borders. On dry land it is necessary to have a clean-cultivated strip on each side of the shrub row to provide space in which the roots can

range for moisture and nutrients without competition from weeds.

Only thoroughly drought-tolerant and cold-tolerant shrubs should be selected for barriers and screens. Obviously, if shrubs in such plantings kill back occasionally they cannot fully accomplish their purpose.

Every screen, hedge and windbreak should have a full stand of plants. Gaps in such plantings nullify their effectiveness. Shrubs which fail to survive transplanting would be replaced as soon as possible.

Filling gaps in such dry land plantings usually cannot be done successfully later than two years after the original planting. After that time, root competition from the neighboring established shrubs is usually so great that young bare-root replacements cannot get started. Container-grown replacement stock would be good insurance against permanent gaps.

Tall shrubs make good background plantings for borders of lower shrubs and perennials. Some also are satisfactory as single specimens. Too many such specimens should be avoided, however, as they give the effect of an orchard rather than of a well-designed ornamental planting.

For tall-shrub screens and windbreaks, evergreens are preferred as they are fully effective the year around. In the central plains climate deciduous species are bare of foliage five or six months of the year.

A few tall evergreen coniferous shrubs are cold-tolerant but they have not been adequately tested for drought-tolerance. Several cone-bearing evergreen trees have dwarf forms which are properly called tall shrubs. Regretfully, none of these has been sufficiently tested for drought tolerance.

There are, however, three coniferous evergreens which are classed as trees—Pinon Pine (*Pinus edulis* Engelm.). Eastern Red Cedar (*Juniperus virginiana* L.) and Rocky Mountain Juniper (*Juniperus scopulorum* Sarg.). These are probably the most drought-tolerant evergreens that have been planted on the central plains. When grown under dry land conditions and spaced closely in a row, as in a screen or windbreak, these evergreens never reach more than tall-shrub size. If left unpruned they take on a bush-like form.

Only one tall broadleaf evergreen shrub is suitable for dry land gardens—Curlleaf Mountain Mahogany (*Cercocarpus ledifolius* Nutt.), native in the Rocky Mountains. Unfortunately, its leaves are so small and sparce that it is little better than a deciduous shrub for screens and protective plantings. It is however, an interesting shrub for border plantings.

From among the many tall deciduous shrubs which are both cold- and drought-tolerant, nine have been selected as being specially suitable for dry land gardens. These nine species represent eight different plant families.

Acer glabrum Torr. Mountain Maple. A neat, smooth-barked native shrub. The buds are red in winter and the seed-wings are pinkish.

Buddleia alternifolia Maxim. Fountain Butterfly Bush. Arching branches are covered in May or June with honey-scented, purplish little flowers. The foliage is an attractive gray green. Good in borders and as specimens.

Caragana arborescens Lam. Siberian Pea Shrub. Abundant yellow flowers in spring resemble small sweet peas. They are followed by interesting small pods. Excellent for windbreaks and hedges.

Better adapted to the northern than to the southern part of the central plains.

Forestiera neomexicana A. Gray. Wild Olive. A native shrub similar to privet with tiny blue-black fruits. Good for hedges and windbreaks.

Prunus pensylvanica L.f. Pin Cherry. A native shrub good for border or specimen planting. White flowers in late spring are followed by bright red berry-like fruits.

Prunus virginiana melanocarpa A. Nels. 'Schubert'. Schubert Chokecherry. A native shrub for borders or for specimen planting. A strikingly different chokecherry. The current season's growth has red foliage which contrasts interestingly with the green leaves on the older branches. A fine ornamental shrub.

Rhamnus cathartica L. Common Buckthorn. A spiny shrub with dense foliage and clusters of black berries which hang on all winter. Excellent for screens, windbreaks and either clipped or informal hedges.

Shepherdia argentea Nutt. Buffaloberry. A native shrub, somewhat thorny, with silvery leaves and red or yellow fruits, good for jelly making. Suitable for screens, windbreaks and hedges.

Tamarix pentandra Pall. Often listed as *Tamarix amurensis* Hort. in horticultural literature. The hardiest tamarisk. Purplish branches, feathery foliage and pinkish flowers in summer. Good for windbreak and background plantings. Its cultivars 'Pink Cascade' and 'Summer Glow' are more ornamental than the species type.

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FOCUS on COMMON STAGHORN FERN [*Platycerium bifurcatum*] *in the BOETTCHER MEMORIAL CONSERVATORY*



Peg Hayward

The fern is a flowerless plant which belongs to the third division of the plant kingdom, *pteridophytes.* Ferns are among the oldest known plants and were once the dominant plants on land. Before dinosaurs roamed the earth, ferns were growing, reproducing, and decomposing throughout the ages. Fossil remains in rocks and coal record their past and relate their grandeur.

In medieval times, mysticism surrounded the ferns. People questioned how ferns could reproduce without flowers. The life cycle of the fern is fascinating. Although spores come from ferns, fern leaves do not come directly from spores. The fern reproduces by means of spores which are borne in small, brownish cases grouped in dots or lines on the backs or sides of the leaves. When the spores ripen, the cases burst open and the spores fall to the ground or are air-borne a few feet or perhaps over many miles. With moisture and light, these tiny single-celled organisms start to grow, the first cells dividing and later new cells dividing and redividing. Soon orderly arrangements of cells form little green heart-shaped plants or *prothallia.* As the *prothallia* grow, rhizoids which function as rootlets reach down for nourishment and moisture. *Antheridia,* male organs, and *archegonia,* female organs, develop on the underside of the *prothallia.* At maturity, with a drop of moisture as a path between the opposite organs, motile sperm cells, *spermatozoids,* swim to the *archegonia* to fertilize the egg cell. The

egg cell then divides and redivides to form a young sporophyte, the start of a new generation. This process of reproduction in the fern is called alternation of generations.

Ferns have a wide geographical distribution. The 10,000 different species and varieties have been found growing sparsely in the Arctic to varieties burgeoning in the tropics.

The genus *Platycerium, Polypodiaceae* family, comprises a large group commonly known as the staghorn ferns. In silhouette, the fertile leaves are uniquely forked, giving a noble, antlerlike appearance. *Platycerium* is derived from the Greek *platys*, broad, and *keras,* a horn, in allusion to the broad flat fertile fronds. These ferns are epiphytic in habit and occur clasping to the trunks or branches of trees. They have sufficient nutrients in the humus they collect to live independently.

Platycerium bifurcatum (Cav.) C. Chr., native of Australia, is a bizarre, much admired staghorn fern. The short rhizome has two kinds of leaves. Shield-shaped mantle leaves curl back and clasp the stem. These round leaves with wavy margins are the sterile leaves. In nature, the shields assume nearly vertical positions from tree trunks or crotches of limbs. The outermost shields are green. Older ones eventually become brown and finally rot. Shields have a definite purpose of catching and storing moisture and any organic material washed into them. Fertile fronds radiate from the center of the shields. They are 2 to 3 feet long and 2 to 3 times forked, narrow at the base, widening out and branching into lobes like a stag's horn. These pendant fronds are leathery and covered with fine hairs on the lower side. *Sporangia* appear on the underside of the "antlers" closely spaced over the apical lobes. At maturity they become confluent, giving the leaf a brown, velvety surface.

P. bifurcatum is easy to cultivate and makes an excellent house plant. Propagate by removing offsets at any time and mount on a slab of rough wood or bark, with a pocket of osmunda fiber to contain the roots, and hang vertically to give a natural setting. Best results require a humid atmosphere and plenty of indirect light.

Staghorn ferns are a curiosity among the fern family and never fail to draw attention.

Meet the Natives – M. Walter Pesman

A color-key guide for the identification of Colorado wildflowers.

AVAILABLE IN THE GIFT SHOP

PLANTS FOR LANDSCAPING AT HIGH ALTITUDES

Compiled by George Kelly

During the past decade year-round living in mountainous areas has become increasingly popular. In fact, the trend is toward building complete sub-divisions of mountain homes.

These high-country residents have been seeking information on the types of plant materials that will do well at their altitudes and enhance their home landscaping. Unfortunately, little research has been done under these conditions. To date, most information available is based on casual observation and the experience of a few plantsmen.

"Although experience is probably the best teacher in this case," according to Dr. James Feucht, area extension horticulturist, "it is often difficult to translate the experience of one person in one location so that it will be applicable to another location.

"As anyone who has tried to grow plants in the mountains will know, much more attention must be given to microclimatic conditions. This is a complex science in itself. So far, where plantings of introduced materials have been successful, it has been the result of trial and error or educated guesses."

At a recent Colorado Nursery, Shade Tree and Turfgrass Conference a panel discussion considered "Plants for High Altitude Landscaping." Participants were Jerry Morris, Ruth Nelson, Henry Pederson and Harry Swift, with George Kelly, moderator. The accompanying list, compiled by Mr. Kelly, suggests plants suitable at various altitudes and is based upon the experience of members of the panel. This list is the most up-to-date available but is subject to constant revision. As Mr. Kelly points out, no attempt has been made to classify these plants except by altitude range and size category. Some may require shade or a protected location while others prefer a hot, dry situation. Some may survive under average conditions, still others may need special protection or special requirements. It is a good policy to use those native plants which normally grow under conditions similar to those provided in the proposed site.

Any readers who have had experience with plants other than those mentioned here or whose experiences will substantiate the lists are invited to correspond with members of the panel, with George Kelly, McElmo Route, Cortez 81321 or write to Dr. James Feucht, 909 York Street, Denver, Colorado 80206.

PLANTS FOR USE AT HIGH ALTITUDES IN COLORADO 6,000 TO 8,000 FEET

This might include such communities as Colorado Springs, Idaho Springs, Estes Park, Kremmling, Glenwood Springs, Walsenberg, Trinidad, Canon City, Golden, Cedaredge, Salida, Alamosa, Steamboat Springs, Meeker, Dillon, Craig, Gunnison. (most of the hardier plants used at lower altitudes will grow here under protected conditions.)

EVERGREEN TREES, Native

Lodgepole Pine, *Pinus contorta latifolia*
Ponderosa Pine, *Pinus ponderosa*
Pinion Pine, *Pinus edulis*
Bristlecone Pine, *Pinus aristata*
Limber Pine, *Pinus flexilis*
Blue Spruce, *Picea pungens*
Douglas-fir, *Pseudotsuga taxifolia*
White Fir, *Abies concolor*
Colorado Juniper, *Juniperus scopulorum*
Desert Juniper, *Juniperus monosperma*

EVERGREENS, Introduced

Blackhills Spruce, *Picea glauca densata*
Scotch Pine, *Pinus sylvestris*
Austrian Pine, *Pinus nigra*

DECIDUOUS TREES, Native

Quaking Aspen, *Populus tremuloides*
Plains Poplar, *Populus sargentii*
Balsam Poplar, *Populus balsamifera*
Lanceleaf Poplar, *Populus acuminata*
Narrowleaf Poplar, *Populus angustifolia*
Boxelder, *Acer negundo*
Western Hackberry, *Celtis occidentalis*
Peachleaf Willow, *Salix amygdaloides*

DECIDUOUS TREES, Introduced

Silverleaf Poplar, *Populus alba*
Cutleaf Weeping Birch (and others), *Betula spp.*
Honeylocust (and varieties), *Gleditsia triacanthos vars.*
Russian-olive, *Elaeagnus angustifolia*
Green Ash, *Fraxinus pennsylvanica lanceolata*
Siberian Elm, *Ulmus pumila*
Lindens, *Tilia spp.*
Hardier Oaks, *Quercus spp.*
European Mountain-ash, *Sorbus aucuparia*
Soft Maple, *Acer saccharinum*
Norway Maple, *Acer platanoides*
Black Locust, *Robinia pseudoacacia*
Russian and White Willows, *Salix spp.*

TALL SHRUBS (6 ft. and up), Native

Serviceberry, *Amelanchier spp.*
Silver Buffaloberry, *Shepherdia argentea*
Pin Cherry, *Prunus pennsylvanica*
Chokecherry, *Prunus virginiana demissa*
American Plum, *Prunus americana*
American Elder, *Sambucus canadensis*
Rocky Mountain Maple, *Acer glabrum*
Mountain Alder, *Alnus tenuifolia*
False Indigo, *Amorpha fruticosa*
Water Birch, *Betula occidentalis*
Hoptree, *Ptelea trifoliata (or P. baldwini)*
Western Mountain-ash, *Sorbus scopulina*
False Mockorange, *Fendlera rupicola*
Shrub Willows, *Salix spp.*
True Mountain mahogany, *Cercocarpus montanus*
Curl-leaf Mountain mahogany, *Cercocarpus ledifolius*
Rabbitbrush, *Chrysothammus spp.*
Scrub Oaks, *Quercus spp.*
New Mexico Locust, *Robinia neomexicana*
Big Sage Brush, *Artemisia tridentata*
Smith Buckthorn, *Rhamnus smithii*
Mountain Privet, *Forestiera neo-mexicana*

TALL SHRUBS, Introduced

Nannyberry, *Viburnum lentago*
Snowball, *Viburnum opulus rosea*
Peking Cotoneaster, *Cotoneaster acutifolia*
Common Lilac, *Syringa vulgaris*
Late or Canadian Lilacs, *Syringa spp.*
Hardy Mockorange, *Philadelphus spp.*
Siberian Peashrub, *Carangana arborescens*
Beautybush, *Kolkwitzia amabilis*
Bush Honeysuckles, *Lonicera spp.*
English Privet, *Ligustrum vulgaris*
Tamarisk, *Tamarix spp.*
Matrimony Vine, *Lycium chinensis*

MEDIUM SHRUBS (3-6 ft.), Native

Hazel, *Corylus cornuta*
Involucred Honeysuckle, *Lonicera involucrata*
Golden Currant, *Ribes aureum*

Russet Buffaloberry,
Shepherdia canadensis
Redtwig Dogwood,
Cornus stolonifera coloradense
Black Currant, *Ribes americanum*
Gooseberries, *Ribes spp.*
Wild Roses, *Rosa spp.*
Inland Ceanothus, *Ceanothus ovatus*
Apache Plumes, *Fallugia paradoxa*
Mountain Spray, *Holodiscus dumosus*
Cliff Jamesia, *Jamesia americana*
Sandcherry, *Prunus besseyi*
Antelope Brush, *Purshia tridenta*
Threeleaf Sumac, *Rhus trilobata*
Wax Currant, *Ribes cereum*
Thimbleberry, *Rubus deliciosus*
Bog Birch, *Betula glandulosa*
Bunchberry Elder, *Sambucus microbotrys*
Little Fendlerbush,
Fendlerella utahensis
Fernbush, *Chamaebatiaria millefolium*
Manzanita, *Arctostaphylos patula*

MEDIUM SHRUBS, Introduced
Pfitzer Juniper,
Juniperus chinensis 'Pfitzer'
Bridal Wreath Spirea, *Spiraea vanhouttei*
Korean Spirea, *Spiraea trichocarpa*
Cotoneasters,*Cotoneaster spp.*
Korean Barberry, *Berberis koreana*
Shrub Roses: Harison's, Austrian Copper,
Persian Redleaf, *Rosa spp.*

LOW SHRUBS (under 3 ft.), Native
Low Juniper,
Juniperus communis montana
Mountain Lover, *Pachystima myrsinites*
Mountain Ninebark,
Physocarpus monogynus
Bush Cinquefoil, *Potentilla fruticosa*
Snowberries, *Symphoricarpos spp.*
Low False Indigo, *Amorpha nana*
Kinnikinnick, *Arctostaphylos uva-ursi*
Creeping Mahonia, *Berberis repens*
Fendler Ceanothus, *Ceanothus fendleri*
Snowbrush Ceanothus,
Ceanothus velusinus
Cactus species
Rocky Mountain Sumac,
Rhus cismontana
Red Raspberry, *Rubus strigosus*
Soapweed, *Yucca spp.*

LOW SHRUBS, Introduced
Creeping Junipers,
Juniperis horizontalis
Named Cinquefoils,
Potentilla spp. & cvs.
Dwarf Caragana, *Caragana pygmaea*
Froebel Spirea, *Spiraea bumalda* 'Froebel'
Snowberries, *Symphoricarpos spp.*
Alpine Currant, *Ribes alpinum*

VINES, Native
Rocky Mountain Clematis,
Clematis pseudoalpina

COME TOUR WITH US!
July 29, 1971

VINES, Introduced

Silverlace Vine
Hall's Honeysuckle,
Lonicera japonica 'Halls'
Englemann Ivy,
Parthenocissus quinquefolia
Clematis, *Clematis spp. & vars.*
Matrimony Vine, *Lycium Chinensis*

HERBACEOUS PLANTS, Native

Anemone, *Anemone spp.*
Aster, *Aster spp.*
Buckwheats, *Eriogonum spp.*
Blue Flax, *Linum perenne*
Buttercups, *Ranunculus spp.*
Butter & Eggs, *Linaria vulgaris*
Chiming Bells, *Mertensia spp.*
Columbine, *Aquilegia caerulea*
Coneflower, *Ratibida columnifera*
Desert Globemallow,
Sphaeralcea ambigua
False Solomon's Seal,
Smilacena racemosa
Ferns, various genera
Frostweed, *Helianthemum bicknelli*
Gaillardia, *Gaillardia spp.*
Geranium, *Geranium spp.*
Goldenglow, *Rudbeckia laciniata*
Golden Smoke, *Corydalis aurea*
Goldenweed, *Haplopappus gracilis*
Harebells, *Campanula spp.*
Horse Mint, *Monarda fistulosa*
Iris, *Iris missouriensis*
Meadowrue, *Thalictrum*
Penstemons, *Penstemon spp.*
Phlox, *Phlox spp.*
Pussytoes, *Antennaria spp.*
Spiderwort, *Tradescantia occidentalis*
Strawberry (Wild), *Fragaria spp.*
Violets, *Viola spp.*
Yarrow, *Achillea spp.*

HERBACEOUS PLANTS, Introduced

Aconite, *Aconitum spp.*
Baby's Breath, *Gypsophila paniculata*
Bleeding Heart, *Dicentra spectabilis*
Columbine, *Aquilegia spp. & vars.*
Daisy (Shasta),
Chrysanthemum maximum
Daylily, *Hemerocallis spp. & vars.*
Delphinium, *Delphinium spp. & vars.*
Iris (German), *Iris germanica & vars.*
Peony, *Paeonia officinalis & vars.*
Phlox (perennial), *Phlox spp.*
Pinks, *Dianthus spp.*
Poppy, *Papaver spp.*
Soapwort, *Saponaria spp.*
Statice, *Armeria spp.*
Sweet Pea, *Lathyrus spp.*
Sweet William, *Dianthus*
Tansy, *Tanacetum vulgare*

8,000 to 10,000 feet

Here is the really difficult altitude. Includes such communities as Cripple Creek, Fairplay, Central City, Walden, Aspen, Vail, Crested Butte, Lake City, Creede, Silverton, Telluride, Ouray, Leadville.

EVERGREENS, Native

White Fir, *Abies concolor*
Blue Spruce, *Picea pungens*
Englemann Spruce, *Picea englemannii*
Douglasfir, *Pseudotsuga taxifolia*
Alpine Fir, *Abies lasiocarpa*
Bristlecone Pine, *Pinus aristata*
Limber Pine, *Pinus flexilis*
Lodgepole Pine, *Pinus contorta*
Ponderosa Pine, *Pinus ponderosa*

EVERGREENS, Introduced

Scotch Pine, *Pinus sylvestris*
Austrian Pine, *Pinus nigra*
Mugho Pine, *Pinus mugo mugus*

DECIDUOUS TREES, Native

Narrowleaf Cottonwood,
Populus angustifolia
Balsam Poplar, *Populus balsamifera*
Quaking Aspen, *Populus tremuloides*
Boxelder, *Acer negundo*
Western Hackberry, *Celtis occidentalis*

DECIDUOUS TREES, Introduced

Silver Poplar, *Populus alba*
Norway Maple, *Acer platanoides*
Silver Maple, *Acer saccharinum*
Mountain ash, *Sorbus aucuparia*
Bolleana Poplar, *Populus alba* 'Bolleana'
Many apples and crabapples, *Malus spp.*

TALL SHRUBS, Native

Rocky Mountain Maple, *Acer glabrum*
Rocky Mountain Alder, *Alnus tenufolia*
Rocky Mountain Birch, *Betula occidentalis*
Pin Cherry, *Prunus pennsylvanica*
Chokecherry,
Prunus virginiana demissa
Shrub Willows, *Salix spp.*
Blackbead Elder, *Sambucus melanocarpa*
Mountain-ash, *Sorbus scopulina*

TALL SHRUBS, Introduced

Shubert Redleaf Chokecherry, *Prunus sp.*
Peking Cotoneaster,
Cotoneaster acutifolia
Amur Maple, *Acer ginnala*
Golden Elder,
Sambucus canadensis 'Golden'
Zabel Honeysuckle,
Lonicera korolkow 'Zabel'
Common Lilac, *Syringa vulgaris*
Staghorn Sumac, *Rhus typhina*

MEDIUM SHRUBS, Native

Bog Birch, *Betula glandulosa*
Redtwig Dogwood,
Cornus stolonifera coloradense
Involucred Honeysuckle,
Lonicera involucrata
Azalea, *Rhodendron albiflorum*
Gooseberries, *Ribes spp.*
Currants, *Ribes spp.*
Wild Roses, *Rosa spp.*
Redberry Elder, *Sambucus pubens*
Russet Buffaloberry,
Shepherdia canadensis
Artic Willow, *Salix arctica*
Austrian Copper and Harison Roses,
Rosa spp.
Hanson Bush Cherry, *Prunus besseyi var.*

LOW SHRUBS, Native

Low Juniper, *Juniperus communis*
Mountain Lover, *Pachystima myrsinites*
Mountain Ninebark,
Physocarpos monogynus
Salmonberry, *Rubus parviflorus*
Mountain Snowberries,
Symphoricarpos spp.
Huckleberries, *Vaccinium spp.*
Few-flowered Viburnum,
V. pauciflorum
Bush Cinquefoil, *Potentilla fruticosa*

VINES, Native

White Clematis, *Clematis ligusticifolia*

VINES, Introduced

Yellow Clematis, *Clematis orientalis*
Woodbine,
Parthenocissus vitacea (quinquefolia)
Wild Grape, *Vitis spp.*
Hopvine, *Humulus lupulus*
Hall's Honeysuckle, *Lonicera japonica*
Silverlace Vine, *Polygonum auberti*

HERBACEOUS PLANTS, Native

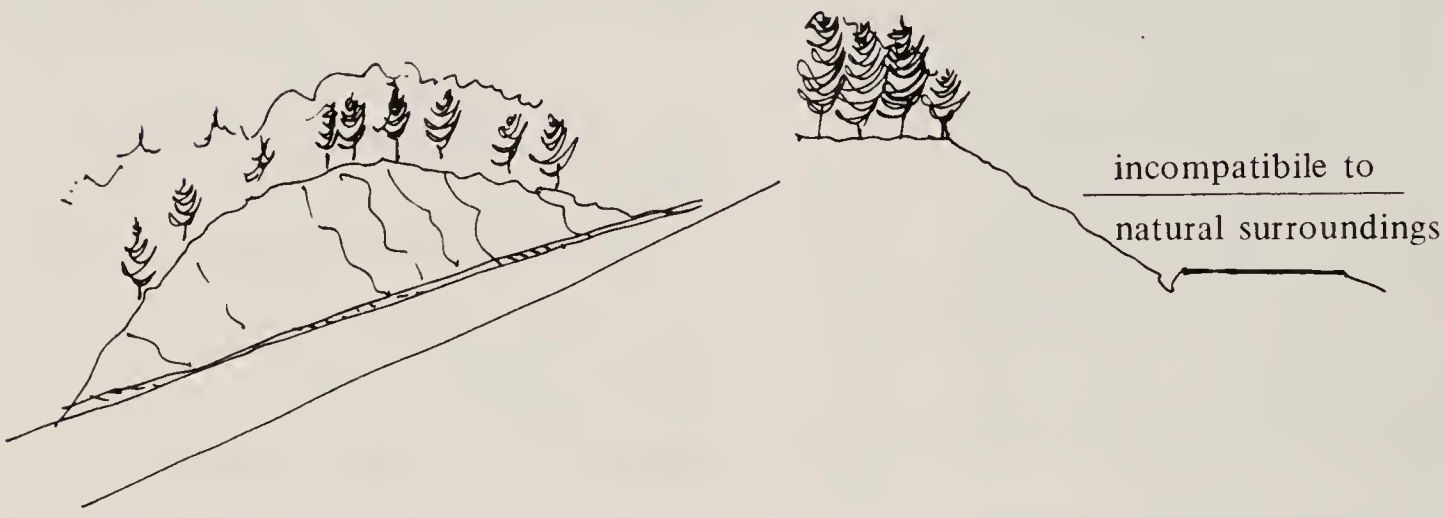
Asters, *Aster spp.*
Chimingbells, *Mertensia spp.*
Columbine, *Aquilegia caerulea and*
A. saximontana
Harebells,
Campanula uniflora & others
Meadowrue, *Thalictrum spp.*
Penstemons, *Penstemon spp.*
Pipsissiwa, *Chimaphila umbellata*
Purple fringe, *Phacelia sericea*
Senecio, *Senecio spp.*
Shooting Star, *Dodecatheon pulchellum*
Violets, *Viola spp.*
Yarrow, *Achillea millefolia*

HERBACEOUS PLANTS, Introduced

Bleeding Heart, *Dicentra spectabilis*
Columbine, *Aquilegia spp. & vars.*
Delphinium, *Delphinium hybrids*
Peony, *Paeonia officinalis*
Phlox (perennial), *Phlox spp.*
Pinks, *Dianthus (alpines are best)*
Poppies, *Papaver spp.*

Aligning our Highway with Environmental Landscape Design, Part II

Gerald F. Kessler



PLANT SELECTION

Knowledge in selection of low maintenance native plants, location, placement, recognizing surface drainage, and installation, offers a more economical and satisfying solution to visual roadside beauty than the expensive water tank operation or sprinkler system to support shrubbery that is not native to the region and is not likely to survive.

Using drought resistant plants that possess a survival suitable to Colorado's climate is essential for the rugged, low maintenance planting.

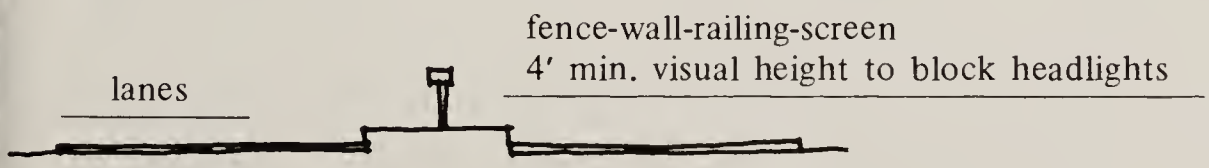




LANDSCAPE DESIGN FOR SAFETY

Variety is an important factor in safe driving. The tendency in the past toward long, straight, visually uninterrupted stretches of road proved to cause hypnosis and fatigue. Varying median strip widths and plantings now and then, use of local features for emphasis and contrast has proven to be essential to design and helps promote safety. Variety can often save on cost and save erosion problems; making a highway a pleasing, rolling, piece of architecture is complementary to natural surroundings. This variety is used in other states but seldom has it been done in Colorado. A grassy width can discourage lane crossing and head on collisions, and is much more impressive than median fences.

When lack of space does not allow a wide median strip to be used, a fence or other structure should be installed to screen the on-coming headlights of the opposite lane. There should be a barrier low enough to see over but high enough to cut the glare—this is particularly important on blind curves. Instead of the practice of the past, of reducing the total right of way and median to asphalt and curbs, steel fences (see 6th Avenue Highway 40—very ugly), or concrete barriers (the Boulder Turnpike—better); a wide median strip increases safety, interest, esthetics, and also provides potential expansion space. Car position and awareness of traffic, apparent speed and orientation have been demonstrated to be factors of landscape design choices.



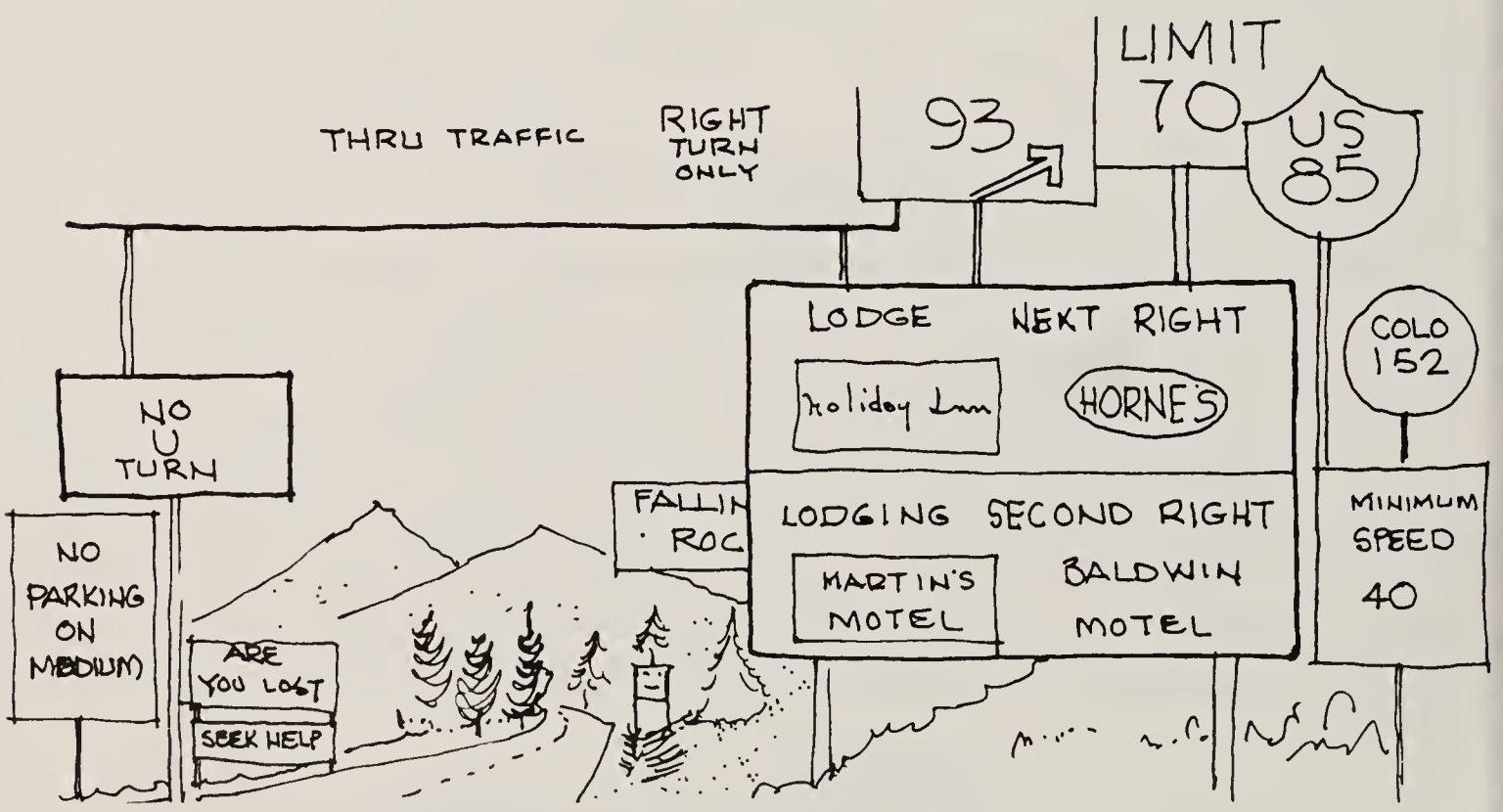


CLIMATE CONTROL

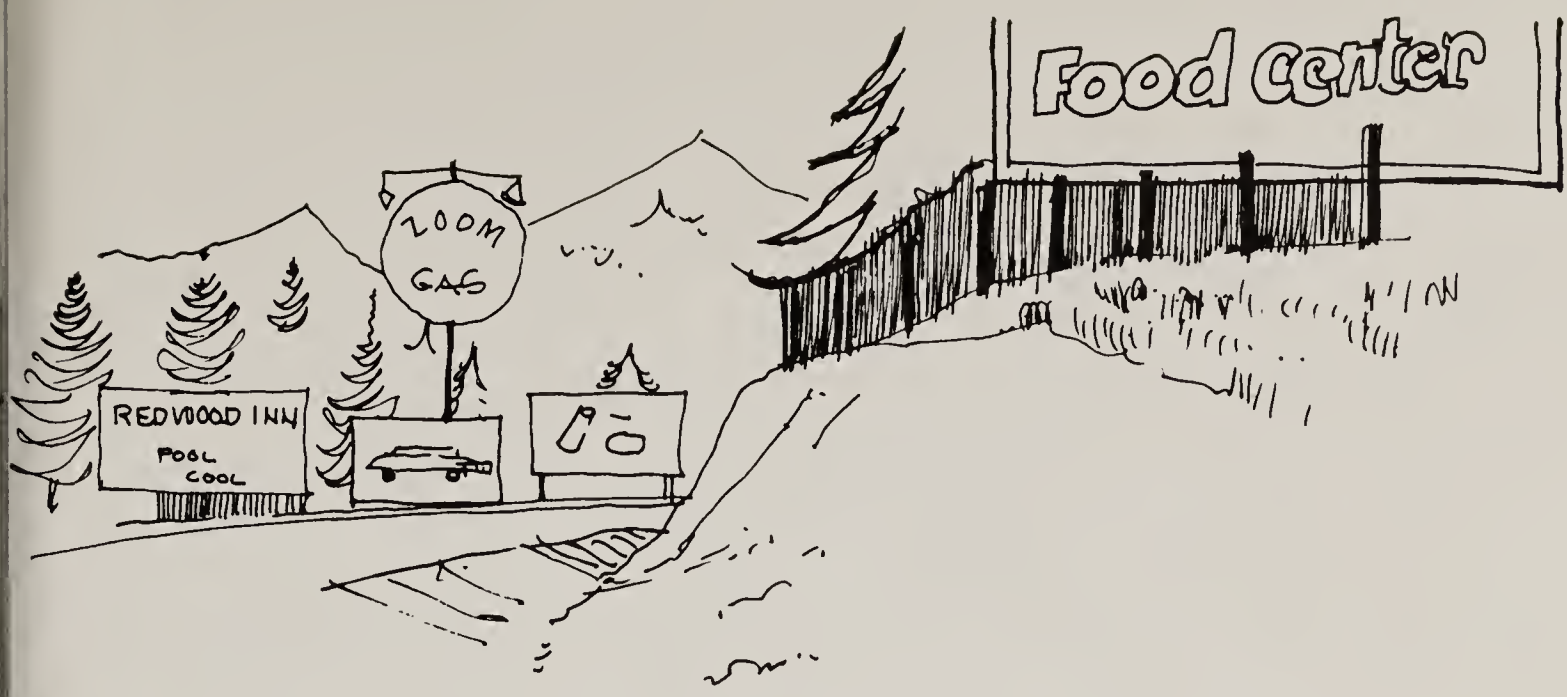
We know that we can discriminate contrast in brightness better under full daylight than at dusk. Landscape used effectively in the installed road system can control sunlight, snow, ice, bright contrast, wind, fog and snow drifting. The drivers response to where he is has been demonstrated to be the reaction to familiarity in visual images. Carefully calculated use of landmarks, structure, scale relationships, and plantings, are all factors of landscape design controlled by route selection, alignment, contouring, planting and positive use of open space.

LANDSCAPE DESIGN AND COMMUNITY VALUES

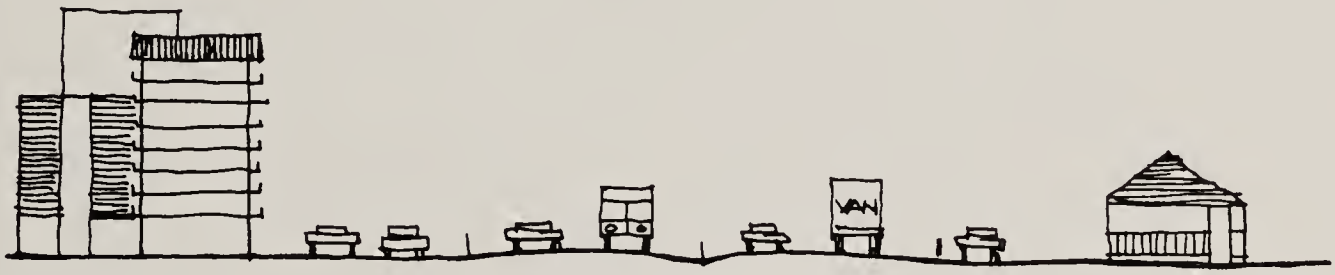
The Highway Beautification Act of 1965 has brought to our attention that roads are more than conduits or corridors of commerce and transportation. The good intentions that created this program have degenerated tremendously. It has become evident that good landscape design or cosmetic treatment takes more than fences and scattered shrubs to blot out man's ugliness, created blight and new visual eyesores lining our highways.



Change of alignment and taking advantage of natural and man-made ground forms, appropriately lowering or raising grades, and integrating planting systems will add interest and variety to the roads by emphasizing distant or close by scenes and significant landmarks giving pleasant and interesting glimpses or blacking out the urban and rural environment.



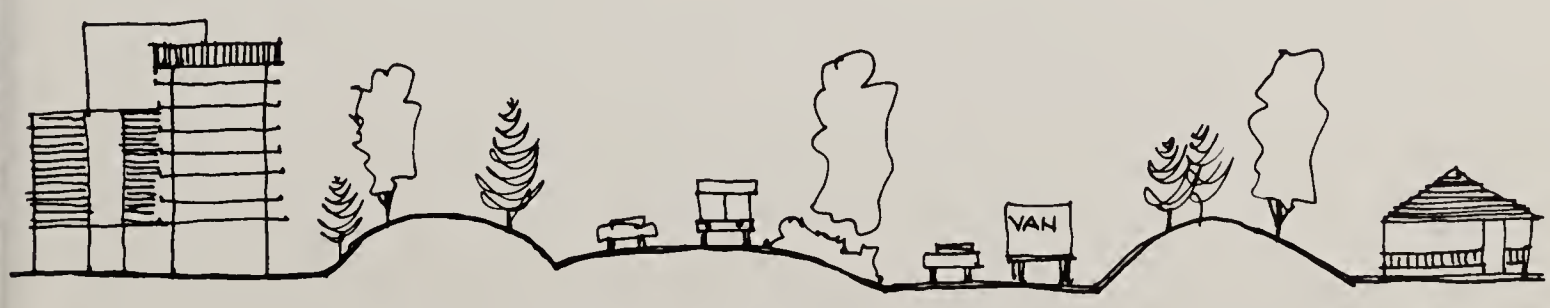
Information and directional highway signs must assist the driver without cluttering the landscape and taking their attention from driving.



work — squeezed into min. space — home

disruption - physically, visually
mentally and economically

Compare the relative community values of a strip of highway between walls of concrete, brick, steel and glass building; and the same scene adjacent to a well-conceived parkway system emphasizing the natural environment with designed rights of way. This is a way to make a visual air-sound relief barrier for crowded urban centers. The physical barrier of highways can be a social and economic asset or liability.



WIDER – SAFER – BUFFERED – VISUAL

land values remain higher - physically compatible



SUMMARY

1. Environmental landscape design and road-building are integral and inseparable—roads are themselves a function of landscape design!

2. Community values, physical, social and economic, are closely affected by the road quality, location, visual appeal and people considerations.

3. Far from being an added cosmetic frill, consideration of landscape design is more likely to reduce both initial construction and ultimate maintenance cost than to increase it.

4. We are only beginning to understand the relationships between total road environmental experience—route selection, alignment, corridor designation, visual vistas, landscape design concepts, paving color and texture and safe driving.

In Appreciation

The Editorial Committee of *The Green Thumb* wishes to express its appreciation to David A. Blades for his services as editor of *The Green Thumb.* In the past two years he has served in a dual capacity. The pressure of his duties in the Conservatory has become so great, however, that he has asked to be relieved of his editorship. His resignation has been accepted with regret.

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DENVER, COLORADO

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

SUMMER 1971



THE COVER

Decorative waterway, a feature of the reconstruction of the garden area at Denver Botanic Gardens.

Photo by Frank Barrett, Wright-McLaughlin Engineers

THE GREEN THUMB

VOL. TWENTY-EIGHT, NUMBER THREE

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The Green Thumb

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MARGARET SIKES, *Editor*

SUMMER 1971

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in Boettcher Memorial Center at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colo. 80206, or call 297-2547.

PROGRESS IN THE GARDENS

Andrew R. Knauer



The major step in reconstruction of the entire garden area at York Street has now been taken. This first step was a contract for massive earth moving construction of the decorative water system, and installation of a complex plumbing system for irrigation and drinking water distribution.

The supply for the decorative waterways originates from four tall pylons in the upper lake uniquely designed with horizontal fins which emphasize the cascading effect of the water as it falls 15 feet to the lake surface. To the north and east of this lake is a large earthen pyramid which forms an interesting architectural element and functionally will serve as the major overlook for the gardens and a viewpoint toward the mountains.

The course of the water, through a series of interconnected ponds and lakes, creates a myriad of interesting effects such as turbulent rushing waterfalls, silent sheet-like falls, rushing sluices, slow calm streams. All of these elements are highlighted by jets of water provided by recirculating pumps.

The water course changes abruptly below the lower lake; after crashing over 6 foot waterfalls, it then follows a "natural" stream into the Japanese Garden area where it meanders through quiet channels between various islands. From this point the water flow increases, progressing through a simulated mountain stream and into the pool at the Gates Garden.

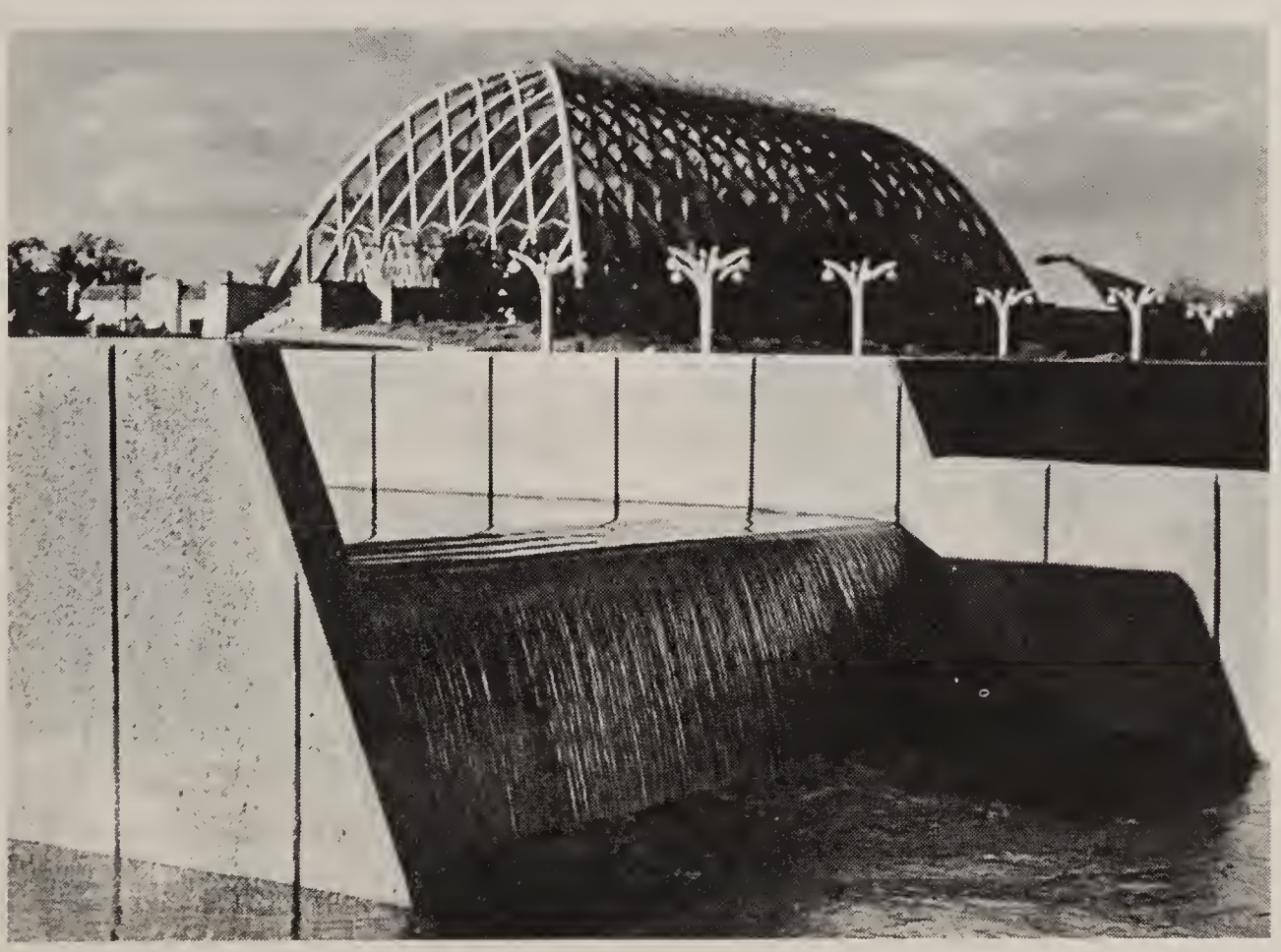
This latter pool exists much as in the past, but has been completely rebuilt. This is the lowest point in the decorative water system; from here the water flows into a pump house and is recirculated to the pylon fountain heads.

The entire garden relates to this intricate water system; the visitor in walking through the garden will never be entirely out of sight or sound of water – certainly a pleasant experience in our arid country. The water system has been called the "back bone" of the new garden development. This certainly is true. Also the special treatments of the grading serve as the "body", giving form, spatial definition and separation of areas.

The "skeleton" of the garden is also evident now in a maze of what are apparently depressed channels criss crossing the area. These "channels" are beds for walks and roadways which now await a latter contract for construction. These walks will serve a number of different purposes. Obviously to move the visitor around and through the various plantings, to additionally define areas, to protect plantings, to provide all weather access, to transport elements of construction and to illustrate innovative surfacing.

Not at all at a standstill, construction goes on in the gardens. Currently the new entrance gateway is under construction. This is designed by Hornbein & White, architects for the new Education Building, with the work being done by Edward Tamminga. It includes a pergola-like overhead structure, a shelter house for a guard and turnstiles. These elements are incorporated with the existing masonry piers and wrought iron gates.

Landscape planting has begun around the new Education Building and plans call for completion this season.



Definitive planning for the Service Area west of the present greenhouses is well underway and basic elements in this area should be under construction by early autumn. The immediate necessity of construction of this area is to provide a base of operations for future phased construction projects as well as serving the on-going maintenance programs.

Along with these various construction projects is the major job of reconditioning the soil over the entire site. The first steps are being taken now. This consists primarily of breaking up the massive clay lumps of the soil, the structure of which had been totally destroyed, growing sudan grass and other "cover crops" on it, adding organic matter and working it again to a manageable state.

The completed contract for waterways, grading and pipelines was under the supervision of Wright-McLaughlin Engineers as well as the Landscape Architects, Eckbo, Dean, Austin and Williams. Langfur Construction Company was the general contractor; Kesson & Sons Inc., subcontractor for pipelines; John F. McCauley Co. Inc., mechanical contractor; Shelton Bros., Excavating, earth moving; Herbert Siddle, drainage; Consolidated Engineering, electrical; and International Shotcrete, Gates pool reconstruction. The total cost of this work was slightly in excess of $280,000.

STAFF ADDITIONS

On January 1st, 1971, Solange Huggins was appointed the first full-time librarian of the Helen Fowler Library. Note of her appointment appeared in the **Green Thumb Newsletter**, but without any details.

Mrs. Huggins' qualifications include the B.S. degree from Annhurst College in South Woodstock, Conn., with subject emphasis on Biology and Chemistry. She also holds the M.S. degree in Medical Technology from Georgetown University, Washington, D.C., and the M.A. in Librarianship from the University of Denver. She has taken other separate courses, chiefly in Education. In addition to her experience in the teaching of Biology and French, she has worked with periodicals in the Business Library of the University of Denver, and was most recently assistant in the Arapahoe Regional Library.

With the expanded library hours made possible by the appointment of Mrs. Huggins, and with the help of numerous volunteers she has recruited, the library has already shown a gratifying increase in use, both circulation and reference, and in additions to the book and periodical collections.

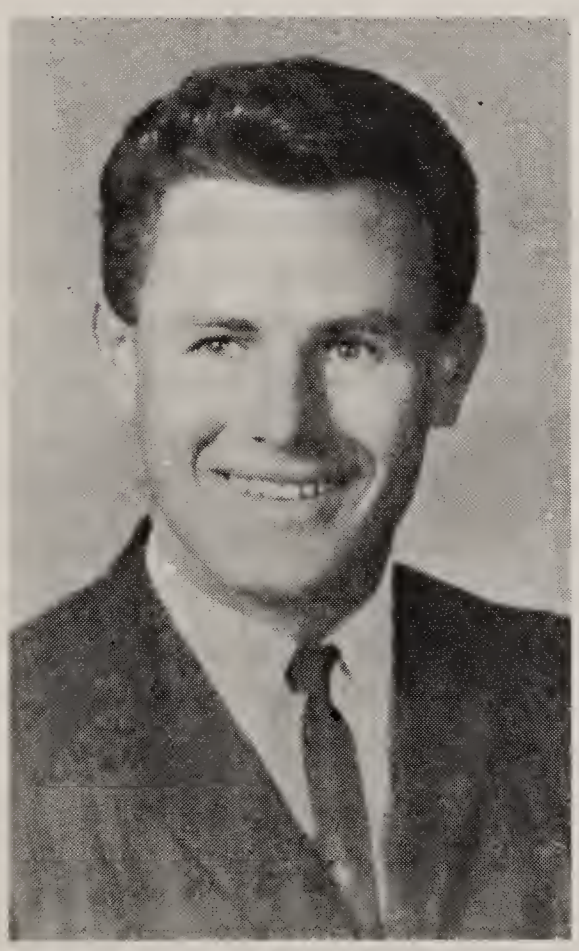
Mrs. Huggins is assisted in the library by Mrs. Bruce Jackson, a part-time staff member. Mrs. Jackson received her undergraduate degree from The College of Wooster and her graduate degree in librarianship from the University of Denver. Her primary interest has been in starting and developing the Junior collection. **The Green Thumb** readers will also be delighted to know that Miss Lucy Crissey, who did so much to establish the library, will continue her dedicated service as a volunteer. Other volunteers also are contributing many hours in behalf of the library. Their work is deeply appreciated.

James M. Schell joined the staff of the Denver Botanic Garden in mid-January, 1971 to take the newly-created position of Horticultural Education Specialist.

Jim is a native of Sterling, Colorado and graduated from Iliff High School, near Sterling. He attended Northeastern Junior College in Sterling, earning the A.A. degree in Agriculture. He then attended Colorado State University earning the B.S. degree in Vocational Agriculture and Biology in 1966. In 1969, Jim received the M.S. degree in Entomology and Plant Pathology also from C.S.U. He then completed one academic year of work toward the Ph.D. degree at Oregon State University in Corvallis, concentrating further in the areas of Entomology and Plant Pathology. During his graduate study at both C.S.U. and O.S.U., Jim served as a graduate research assistant; after earning the Bachelor's degree he spent a year as a vocational agriculture instructor in the high school at Wishek, North Dakota.

Jim tells us that his early life was spent on a farm in the Sterling area. There he obtained much excellent experience in raising various crops under irrigation. Later on he was engaged in renting and managing land on which he raised sugar beets and other irrigated crops.

At Denver Botanic Gardens Jim supervises the various aspects of the developing educational program. His responsibilities are widespread including arranging for tours of the Conservatory in both winter and summer, supervising the scheduling and the use of the rooms in the New Educational Building, planning and developing new phases of the educational program, editing the **Green Thumb Newsletter** and handling arrangements for classes and lectures at the Botanic Gardens. Jim's friendly personality and easy manner in working with people, as well as his family and academic background, combine to make him a very effective and well qualified person. Denver Botanic Gardens is pleased to have a person of his caliber on its permanent staff.



James M. Schell



Solange Huggins



Let's Plant Some Wee Bulbs

Sue Kelly

I often wonder why many people refrain from planting what we know as the "minor" bulbs. These delightful little pixies are really a joy from the moment of discovery in a rock garden or tiny, secluded nook, or from reading and discovering their descriptions in various books and catalogues. I've grown many, and intend to grow more, as soon as we have a suitable spot for them. Just now, in our dry, sandy, hot (mostly unshaded) areas, it is an impossibility. Of course, a lot of planning and hard work will correct most of this!

In planning, read carefully and try to follow the instructions given with the bulbs chosen. However, remember in most cases, these instructions were written for the eastern and moist central and southern parts of the United States. So – adapt them to your own situation. Most of these bulbs may be purchased and planted in the fall of the year. Don't get so busy in September and early October that you forget to order them from the catalogues (with which most of us are deluged) or from your favorite garden supply stores. Then, when you have them, BE SURE TO PLANT. This may sound silly, but often when you're busy, you'll put them aside, intending to plant them later, and then forget all

about them until next spring. Planting as soon as possible after buying is a very good habit. Most bulbs make a root growth in the fall and winter, which brings you many dividends of bloom, and more bloom.

If possible, these tiny bulbs should have a fairly rich soil with excellent drainage. If your garden has been over-worked (raising many flowers without any nourishment being added from time to time) add some bone meal and work it into the soil before planting. DON'T plant too deeply. Water thoroughly, and mark with plant labels, so you'll not try to plant something over them.

We had a delightful spot in Littleton, shaded by big cottonwoods, and we made an irrigation ditch into a winding stream that lent itself to just the spot the wee ones loved. In it, we planted many of the minor bulbs and other choice plants.

We chose with an eye to color, time of bloom, and space. Many small plants will become lost in large scattered areas, so mark them well until you learn their location! We chose and planted snowdrops, *Galanthus;* glory-of-the-snow, *Chionodoxa;* grape hyacinth, *Muscari* (be sure to try the white ones); Dutch iris, *Iris reticulata;* jack-in-the-pulpit, *Arisaema triphyllum;* mariposa lily, *Calochortus; Narcissi* – these include what we commonly call daffodils, jonquils, and narcissus. Also, don't forget the miniatures: the dainty petticoat daffodil, *N. bulbocodium;* spider tulip, *T. acuminata;* candlestick tulip, *T. clusiana;* and a tiny daffodil shaped with narrow tubular trumpets and reflexed petals, *N. cyclamineus.* If you've never grown these, you should! Do try star-of-Bethlehem, *Ornithogalum umbellatum; Puschkinia scilloides* – a dainty scilla-like plant, scillas or squills; snakes-head or guinea flower, *Fritillaria meleagris;* spring beauty, *Claytonia;* wake-robin, (both white and maroon) *Trillium;* trout lily, *Erythronium* (also called dogtooth violet); "species" tulips, *Tulipa spp; Crocus,* both early spring and fall blooming; *Colchicums;* winter aconite, *Eranthis;* wand lily, *Zygadenus;* and *Sternbergia* – a fall blooming yellow crocus that is extremely delightful. Dutchmans Britches, *Dicentra* and *Mertensia,* while not little bulbs, are great foils for some of these bulbs.

Most of these minor bulbs are hardy. If they are happy, they will usually come up year after year to delight you. Some that must be lifted every fall are worth the effort. We've planted fairy lilies, *Zephyranthes,* many colored tiny lilies that make you want to pet them; *Oxalis;* wand flower, *Sparaxis;* and tuberoses, *Polianthes.* Each fall they are dug and put in string bags in a dry cool place to be ready for the next spring. Some we lose – but usually, there are enough left for color.

Perhaps this short list of bulbs we have grown successfully, will whet your appetite to check further into the various little bulbs under each heading. Many long hours of poring over library books and pages in fall and spring commercial catalogues and magazines (so ıe issues of 1970 *Horticulture* are loaded with named varieties) will so ıtrigue you that you'll renew an interest in them or create an interes which can very well become a hobby!



Exotics of Colorado

Tribulus terrestris, Puncture Vine

Helen Marsh Zeiner

Many common weeds are exotics introduced into this country accidentally. This is true of *Tribulus terrestris* L. or puncture vine.

Tribulus terrestris is native to southern Europe. It was brought into the United States many years ago, perhaps by burs embedded in the wool of imported sheep. The plant is now widespread in the western part of the United States, particularly in the dry southwest where it is a very common weed. It is also found, although less abundantly, in many other parts of the United States.

Look for puncture vine on any disturbed soil, especially if it is sandy. Railroad yards, railroad and highway right-of-ways, barnyards, gravel pits, and cultivated fields are all likely spots. When *Tribulus terrestris* is first found in an area, it is usually along railroad tracks or highways where the seeds have fallen from trains or vehicles. The seeds are known to be spread in hay, straw, and manure.

An annual, *Tribulus terrestris* spreads rapidly from seed and may soon become an obnoxious weed in an area. The seeds are long-lived and may remain in the ground to germinate long after they were first scattered.

Puncture vine is often found in Denver alleys. It is aptly named for its fruits which are armed with sharp, stiff spines. They are a painful nuisance to dogs and bare-footed children and are said to sometimes puncture bicycle tires.

Other common names for *Tribulus terrestris* are Mexican sandbur, ground burnut, burnut, land caltrop, bullhead, torrito.

Tribulus terrestris is a member of the family *Zygophyllaceae,* a small family of herbs and shrubs of warm or dry regions. In Colorado, two additional genera *(Zygophyllum* and *Kallstroemia)* are reported, with the possibility that a third *(Larrea)* may be present. Several plants of the desert or semi-arid regions of the southwest belong to this family. Creosote bush *(Larrea divaricata Cav.),* which characterizes the Chihuahuan

desert of the southwest, is an important member of this family. Creosote bush often grows in pure stands and may cover many square miles of desert country.

Puncture vine is a prostrate plant with stems extending out in every direction for distances of 1 to 6 feet. Thus it makes a low-growing, clinging mat. The opposite leaves are pinnately compound with 10 to 14 entire leaflets. Stems and leaves bear silky hairs.

The flowers are borne singly in the axils of the leaves. They are about ½ an inch across, five-petaled and regular, and varying from pale yellow to orange-yellow in color.

Each flower produces a five-parted burlike fruit which breaks apart at maturity into five hard "burs" or carpels. Each bur is armed with two very stiff spines. The fruit is sometimes described as resembling a Maltese cross. It is also likened to a caltrop, which is defined as "an instrument with four iron points so disposed that, any three of them being on the ground, the other projects upward." The common name caltrop comes from the resemblance of the fruit to this trap-like device. This is also the common name for the family *Zygophyllaceae,* although not all members of the family have armed fruits. Creosote bush, for example, has round, fuzzy-white fruits.

If it were not for the wickedly-spined fruits we would probably find puncture vine an attractive plant and not be concerned with eradication. Since the spines are so vicious, however, it is fortunate that the home gardener can control puncture vine by pulling the plant before the seeds ripen.





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The Fauna in the Flora



Wes Woodward

Being an organic gardener, I am always trying to get rid of the bugs in my garden by some natural means. A couple of years ago I ordered a cluster of praying mantis eggs, remembering the mantis monsters I had seen on Guadalcanal. I put the eggs in the tall grass next to the Russian olive and checked on them occasionally. Finally the eggs were gone and I watched for little praying mantises. I never found any.

Last year I thought I had the answer. One of the neighbor's cats "treed" a snake in the top of the Oregon grape. The cat, on the ground below it, made a few half-hearted passes at the snake and that serpent bobbed its head a few times. I don't know what kind of a snake it was, but I was sure it was harmless. Nevertheless, I was also sure my wife would stay out of the garden if she knew it was there, and I resolved to say nothing about it. For a week or so I saw the snake, now and then – in the clump of sumacs or under the peonies. And then it disappeared. Well, that wasn't the answer.

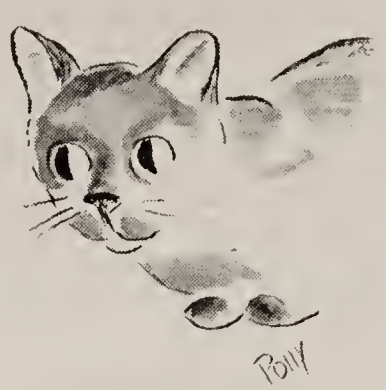
The answer arrived this spring in the form of a turtle about the size of a saucer, wearing black and brown armor. It rested under a juniper in the rock garden. My son Dave fed it hamburger and lettuce and we thought it had come to stay. The next day it was gone, as mysteriously as it had arrived.

The cats are always with us. Not our cats, but neighborhood cats. It's obvious why we have six or seven of them in our garden. The bushes make shade, the flower beds are soft to lie in, and there is loose dirt to dig in wherever I have been planting. Most of the other yards in our block are bare concrete and lawn – not good for cat life. Now I like cats, but they don't really help the gardening. Besides digging up the newly-planted seeds and mashing down tender young plants, they get the birds.

We have visiting dogs too. They don't do a lot of damage but they do tear through the flowers after the cats. We used to have a dog of our own and he wore out the ivy on the side of the garage by rubbing against it. I found that both the dogs and cats liked the odor of the spray that is advertised as being repugnant to them.

Of all the animals that do damage to the garden, the worst are nameless. I've never seen them. They must be large, heavy and agile, judging by the evidence. As the tender spring flowers pop up in the bulb bed, I find that spot suddenly trampled and bare. When the cherries





are ripe, these unknown visitors come when no one's home and strip the trees, leaving a number of broken branches. In the middle of the summer large nesting places appear among the phlox, often containing baseballs or tin cans. And in the fall, just as the grapes begin to ripen, the vines are pulled down, the grapes disappear, and the arbor is broken. Active animals they are, but not helpful in a garden.

I haven't given up. This year I think I shall buy some lady bugs; then we should have the right kind of fauna in the flora.

Book Review

BULBS FOR SUMMER BLOOM

John Philip Baumgardt

Hawthorne Books, Inc., New York, 232 pp. $8.95

Here is an excellent new reference book on plants grown from bulbs, tubers, corms, crowns and other similar root forms. It is written in terms the beginner may comprehend, the grower can appreciate and the more serious student will applaud.

The name of Dr. John Philip Baumgardt is not new to horticulturists. He has written another book on pruning, contributed to newspapers and his articles have appeared in many gardening magazines. He has also taught botany. This teaching background becomes evident in the frequent use of botanical terms which lose their strangeness as he explains them, often with line drawings.

Planting charts, temperature map, colored plates and the many black and white photographs help the reader identify with the subject. A fleeting glimpse is given the history of some bulbs, their botanical differences and something of the problems which have faced the plant breeder developing better clones. Detailed chapters are devoted to the gladiolus, dahlias, lilies and tuberous begonias. All other bulbs are included in the special "A to Z . . ." section and accompanied by helpful line drawings.

Dr. Baumgardt is supposed to have grown everything mentioned in the book. He draws generously from this experience as he instructs in where to obtain bulbs, how to prepare the soil, the special microclimate needed, feeding, pest and disease control, storage and dormancy requirements. He even tosses in a little information on cutting the bloom for indoor enjoyment and show competition.

The reader senses the author's obvious appreciation for each bulb grown plant and concludes with a feeling of having had a pleasant walk in Dr. Baumgardt's garden to observe it growing, plus a personal lesson in the botany, history and culture which brought it to its present perfection of bloom.

— Avalonne Kosanke —

SMALL TROPICAL PLACE

Esther Holtz



A small greenhouse is a pleasure and a fascinating hobby for anyone interested in this indoor type of horticulture. My greenhouse is over 17 feet long and 5 feet wide. As our winters are severe it is a convenience to have the greenhouse attached to one's home. My greenhouse is a lean-to on the south side of the house and has an entrance directly from the dining area. There is also a door on the west end opening to the garden. It is closed during the winter and temporary shelves are installed to house various plants from the garden before the first frost.

The greenhouse is an easily erected pre-fabricated model, resting on a cinder block foundation. Coarse gravel covers the floor; concrete inserts are the walks. Benches are built of sturdy redwood and there are metal trays to hold the pots. Some trays have holes in the bottom to facilitate direct planting. Suspended shelving near the ceiling holds cacti and succulents. Supplementary shelves are often added by using glass bricks and redwood boards. Frosted fiberglass covers most of the greenhouse. The ends are clear glass. With the frosted fiberglass there is never a problem of the plants burning.

The greenhouse has no regulation heating system. It can be classed as "on the cool side." The door from the dining area is louvered glass and during the winter the louvers are opened to heat the greenhouse. When extra heat is needed, an electric heater controlled by a thermostat is available. An automatic roof ventilator helps control the inside temperature and permits me to be away a few days at a time.

A wide variety of plants from cacti and succulents to orchids are my hobby. Cypripedium orchids have grown unusually well because they thrive on cool temperatures. Many plants rest during the summer and for this reason my greenhouse is usually more colorful during the winter months.

I particularly enjoy azaleas, cyclamen, gloxinias, geraniums, rex begonias, bougainvillea, and the cacti and succulents.

In addition to these plants and many others I have a few bonsai. Most of them have been deciduous and evergreen specimens of various sizes. In winter the large evergreen bonsai are put in a window-well on the north side of the house and the pots are completely buried in peatmoss.

The greenhouse is now ten years old and many of the plants in it were given me by friends who encountered difficulty in growing them in their homes.

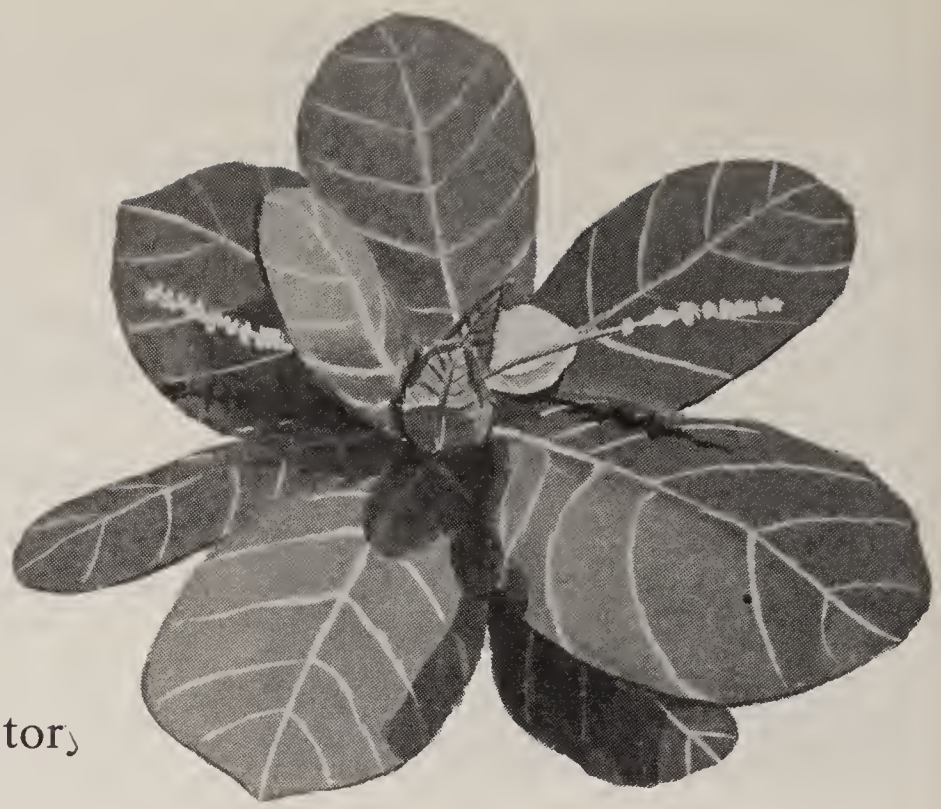
Growing bedding plants for my garden is impractical because of uneven greenhouse heating. However, in the fall, it is satisfying to take choice petunias, chrysanthemums and fuchsias from the yard and bring them into the greenhouse.



FOCUS on TROPICAL ALMOND

in the
Boettcher Memorial Conservatory

Peg Hayward



Terminalia catappa L.

Terminalia includes a group of trees and shrubs of the Combretum family, *Combretaceae.* The name derived from terminus, end, alludes to the leaves being borne upon the terminus of the shoot. About 250 species of *Terminalia,* pantropical genus, are recognized. *T. catappa,* tropical or Indian almond, is well known in American horticulture, but several other species are important in the Orient, principally for their fruits known as myrobalans.

Tropical almond, native of the seashores of Malaya, is a deciduous or partially evergreen tree of stately appearance up to 80 feet in height. The stout, smooth trunk with brownish grey bark is topped with a wide spreading crown. Unrelated to, and unlike, the true almond, *Prunus amygdalus,* this vigorous tree is most easily recognized by its tiers of horizontal branches which grow in whorls at right angles to the trunk. The simple leaves are crowded toward ends of branchlets; they are leathery, obovate, up to 1 foot long by 7 inches broad. Leaves are glabrous above, very finely pubescent below, with venation slightly raised on both surfaces but most prominent on underside. Leaves assume exquisite shades of yellow, red, and purple twice a year before they fall, soon to be replaced with new growth of shiny young leaves.

Slender spikes of small greenish-white flowers without petals are hardly visable amid the foliage. Flower spikes up to 5 inches long are ill-scented. Often all the flowers of a spike are males; sometimes most are males and the few lowermost are females or are bisexual.

Fruits of the tropical almond are elliptic, 2 edged, flattened drupes about 2 inches long, which become yellow slightly flushed with pink. The thick outer skin covers a scant layer of flesh, sometimes eaten by children, and a large seed with a corky husk which encloses a slender, edible kernel. Often the dried seeds can be gathered from the ground

after the outer flesh has been removed by insects. The kernels are eaten without roasting and are described as having a filbert-like flavor. The kernels yield an oil of high quality resembling almond oil.

The wood of *Terminalia* is used for construction and boat building. Bark and leaves of the tree furnish tannin and black ink or dye. In India, the tasar silkworm feeds on the leaves.

Terminalia catappa has been widely planted in tropical countries and in South Florida as a street tree. It is often used at the seashore because due to resistance to salt spray, it is able to thrive within a few feet of the shore line. Although a native of the tropics where storms are usual, this tree never developed wood or foliage capable of resisting the force of a hurricane. A severe storm will often tear the tree to pieces.

Visitors to the Boettcher Conservatory will see a magnificent tropical almond located near the large water fall. *Terminalia muelleri,* native to Queensland, is also in the Conservatory collection. It is a small tree bearing narrowly obovate leaves up to 4 inches long and fruit 3/4 inch long and bluish.

FEATHER IN HIS CAP

Three times in less than a year a very high honor has been conferred on Dr. Aubrey C. Hildreth, Director Emeritus, Denver Botanic Gardens. First came the Arthur Hoyt Scott Garden and Horticulture Award. Second, while attending the American Horticulture Congress, he received the Liberty Hyde Bailey Award. Now, from the National Council of State Garden Clubs, Inc., one of its highest awards, THE SILVER SEAL.

At its 1971 Awards Banquet, Bal Harbour, Florida, National Council presented this latest honor to Dr. Hildreth with the following statement: "The Silver Seal – Awarded an individual, organization or institution other than garden club, for special contribution toward the advancement of the work of garden clubs. Throughout his career, Dr. Hildreth has been exploring the 'hows and whys' of the plant world. Through his columns and his membership in organizations dedicated to science and research, he has made a very definite contribution in the field of horticulture."

To this, the garden clubs of Colorado add, "For actively advancing the work of the garden clubs, for educating our members, for constantly promoting cooperation between the Denver Botanic Gardens and the Colorado Federation of Garden Clubs and for patiently improving many of the plants we now grow in our landscapes, we thank you, Dr. Hildreth. Congratulations from us all!"

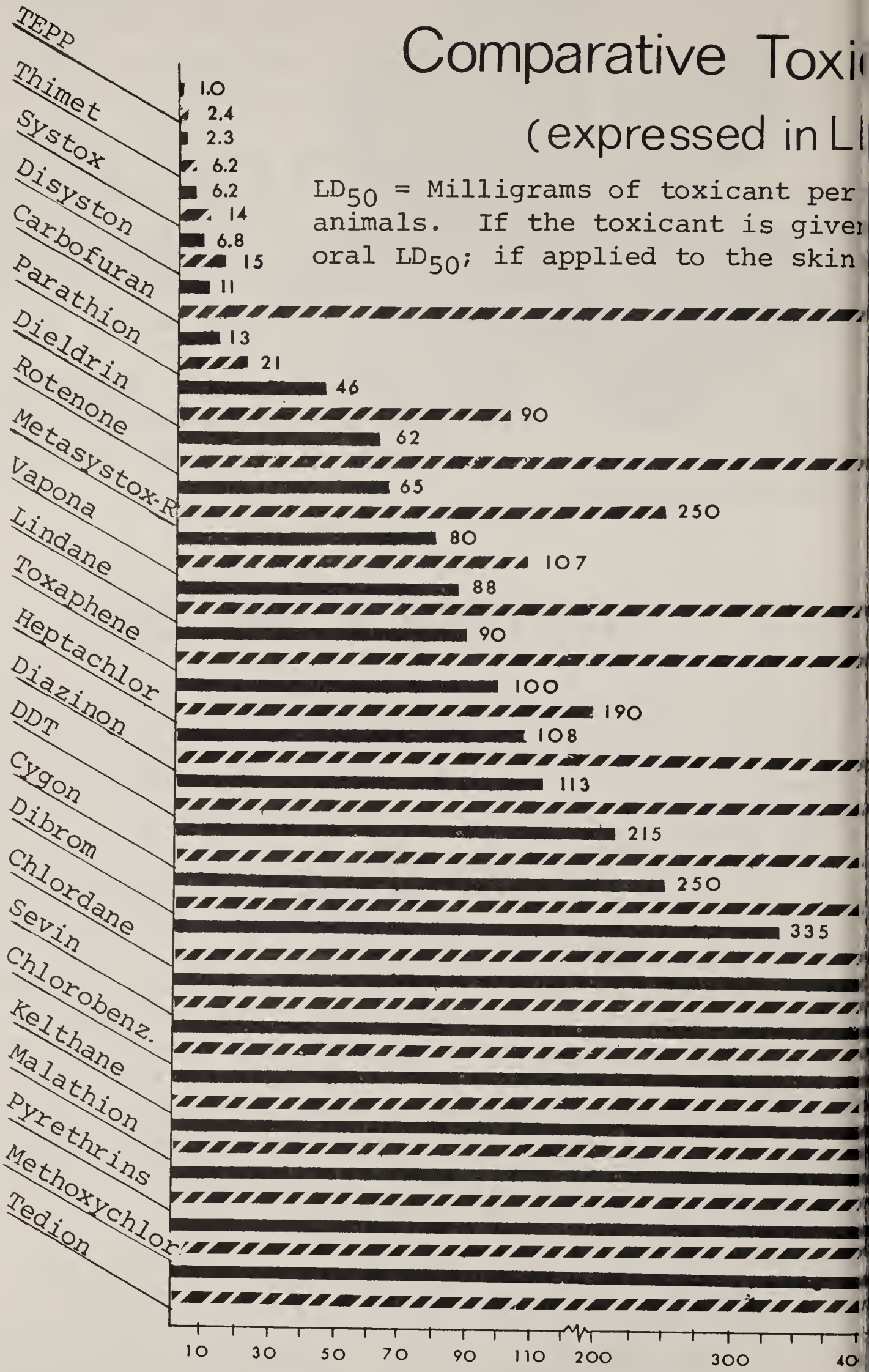
EXCUSE US PLEASE

We regret that the printer transposed parts of the article about Dr. Hildreth (Pages 48 & 49, Spring, 1971). We offer our sincere apologies to Dr. Hildreth and to our readers.

Comparative Toxi

(expressed in L

LD_{50} = Milligrams of toxicant per
animals. If the toxicant is give
oral LD_{50}; if applied to the skin

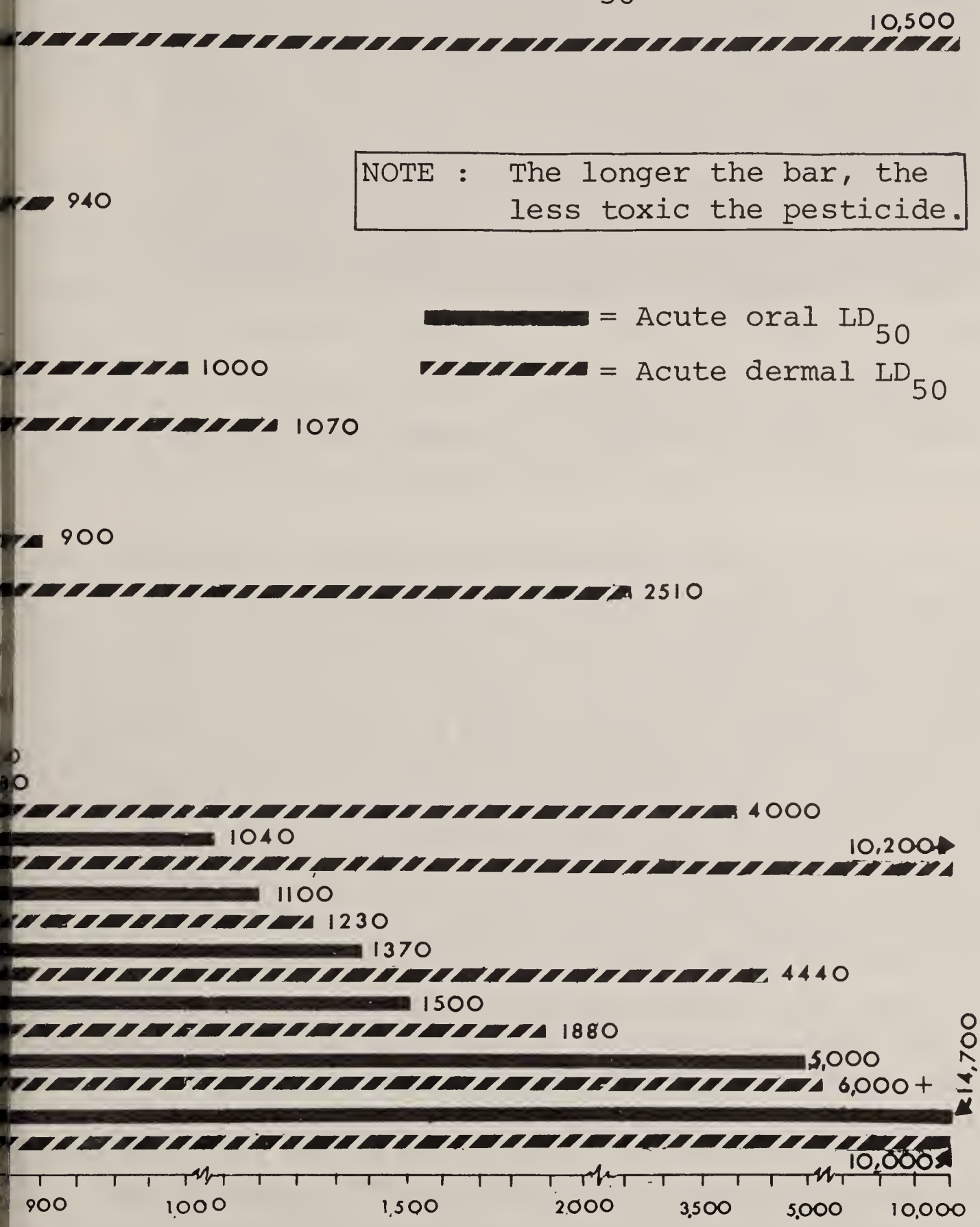


Acute LD_{50}

f Some Pesticides

ral and dermal)

u of bodyweight which will kill 50% of the test
n in one dose it is referred to as the acute
ose it is called acute dermal LD_{50}.



NOTE : The longer the bar, the less toxic the pesticide.

= Acute oral LD_{50}

= Acute dermal LD_{50}

s (mg/kg) of Body Weight

James R. Feucht

USING PESTICIDE TOXICITY CHART

The pesticide toxicity chart is based on a statistical estimate of the amount of pure chemical, applied orally or dermally, to kill 50% of a large population of test animals, usually rats. One should use care in interpreting this chart because it can be misleading.

In the first place, observe that the longer the bar the less toxic the pesticide. Because of space limitations, the LD_{50} scale, which is expressed in milligrams of chemical per kilogram of body weight, is considerably condensed and any bar that is longer than an LD_{50} of 120 should actually be longer than the chart shows. The chart, however, can be used for comparative purposes.

To determine the real value as it would affect man, take the LD_{50} value of a given chemical, multiply it by 0.003, and this will give you the number of ounces of undiluted chemical required to kill 50% of a population of men weighing 187 pounds, providing the chemical is taken all at one time. Most chemicals on the market are not available in the pure state but rather in percentage formulations. A good example is Malathion, which is usually sold at the 50-57% concentration. The oral LD_{50} is 1370 or requiring about 4.1 ounces to kill a 187 pound man. Malathion, as sold in the stores, would require 8 or more ounces taken orally.

It is also easy to draw conclusions and condemn a chemical on the basis of the chart unless you make a complete comparison. Note, for example, that Carbofuran has an oral LD_{50} somewhat more toxic than Parathion (about 0.03 ounces) taken orally to kill a 187 pound man. There is, however, considerable difference in the dermal toxicity of these two. Parathion is readily absorbed through the skin as are most organic phosphates. The dermal toxicity, therefore, is quite high (low in number on chart) or approximately 0.06 ounces. But Carbofuran would require almost 2 pounds dermally applied to cause death. Carbofuran is sold as a 10% granular, so the actual material as marketed would require almost 20 pounds applied dermally to cause death. Similar comparisons can be made with other insecticides listed on the chart.

One should also consider the persistence of the pesticides along with toxicity. These are really two different things. Take, for example, DDT, which would require more than 1/2 ounce of the 50% wettable powder taken orally to cause death. Yet it is considered a less desirable pesticide from the standpoint of the environment than even more toxic chemicals such as Diazinon and Vapona simply because it does not break down readily. Looking at it another way, Methoxychlor has a much safer oral and dermal toxicity than Malathion. Yet, from the standpoint of wildlife, use of Malathion would be more desirable because of its very short persistence.



A New Romance, TREE PEONIES

G. E. "Casey" O'Donnell

These extremely hardy small shrubs, from 2 to 5 feet tall at maturity (15 to 25 years), have very decorative foliage, produce blooms from 3 to 12 inches in diameter, are available in a rainbow of colors from clear light yellow through blends and shades of yellow, pink, salmon, coral, crimson, scarlet, maroon, black-red, lavender, purple, white, and in-between tints which must be seen to be believed.

Culture is easy. Well-drained, average, good garden soil (wet feet is the number one *no no* for *all* Peonies), shelter from strong winds, little or no fertilizing, occasional deep irrigation, not too much competition from nearby (8-10 feet) shrubs or trees, and shallow cultivation are the simple essentials.

Insects and disease are so infrequent that for all practical purposes they may be ignored.

Remove spent bloom, keep the planting free of weeds and grass, remove and burn fallen leaves, relax and enjoy an almost carefree garden subject.

Named varieties of the Japanese Moutans, and the Saunders and Gratwick-Daphnis Lutea hybrids are much more desirable types than are the Chinese or European kinds whose stems do not hold the heavy blooms erect and above the foliage. They are available from a number of growers, importers, and at times can be found in local nurseries.

Prices may be quite modest for two or three-year-old grafts, or rather steep for "specimen" plants and the less readily obtainable Saunders and Gratwick-Daphnis Lutea hybrids. To those avid gardeners who class tree peonies among the necessities of life, a good plant of a desirable variety is a bargain at almost any price. In most cases the plant is a permanent investment, increasing in size and floriferousness for 30 to 50 years.

Probably the best approach to establishing a new tree peony planting is the purchase of the two- to three-year size. These small grafts (all named varieties are propagated by scion grafting to herbaceous peony roots), usually become established quickly, and some, but not all, will produce a bloom or two the first year after planting, grow fairly rapidly, and generally are blooming well by the third or fourth year.

The more expensive "specimen" plants are from five to ten years old, usually bloom fairly well the first season after planting, have passed through the critical "go" or "no go" stage after grafting under the knowing care of an expert grower and are almost sure to survive the shock of digging and transplanting.

However, as would be expected, they are much more expensive, and beyond the third or fourth year after planting are usually no larger than the small graft planted at the same time and given the same care.



The varieties listed below all have a proven history of excellent performance in the Denver area.

MOUTAN – JAPANESE TYPE

TAMA FUYO – "Jeweled Lotus"

The bloom is a light shell pink with a hint of coral. Grows rapidly and blooms well on young plants. A three-year plant in my garden produced eleven eight-inch blooms this spring.

HINODE SEKAI – "World at sunrise"

Glowing pink-red. An eleven-year-old plant decorated with forty-four ten-inch blossoms was the garden eyecatcher for ten days in late May.

TAIYO – "Emperor"

A light, bright red bloom of medium size on a vigorous, well-branched plant.

GODAISHU – "Globe like"

A medium-large clear-white, whose several rows of large, firm petals retain a rounded, cup-shaped form for several days.

GESSAKAI – "Moon world"

A large, airy-appearing double having an unusual crested appearance. Almost translucent white. Vigorous plant. Free bloom. Very fine.

RIMPO – "Bird of Rimpo"

One of the tallest and most vigorous of the Moutans. The medium-large blooms are quite double, and are deep purple with brown-maroon shading. One of my favorites.

LUTEA HYBRIDS

AMBER MOON – (Saunders)

Two to three rows of firm, rounded petals, warm amber yellow flushed and shaded bright rose at the petal tips. Excellent stems, and a vigorous, husky plant. Scarce, but well worth looking for.

CHINESE DRAGON – (Saunders)

A beautiful, vigorous plant having almost lacy deep green foliage, turning to brilliant scarlet after the first frost. The large blooms have at least two rows of petals, are yellow with a red overlay, and are held well erect on good stems. One of the most decorative of the Luteas.

AGE OF GOLD – (Saunders)

The bloom is a soft, mellow, gold rosette having many rows of ruffled petals held well out of the foliage. The plant is medium in height, about three feet, is well branched and quite sturdy.

SOUVENIER de MAXIME CORNU and ALICE HARDING are two of the better, older Lutea hybrids. Both have well shaped, very heavy, full double blooms of excellent color, and are vigorous, hardy plants. However, both are plagued by a common fault: stems too weak to hold the large blooms erect and above the foliage.

The blooms may be cut in the bud stage and floated for days on end in glass or silver containers indoors. Their virtues are wonderful color, ready availability, ease of culture (not that others are difficult, but these two are especially easy,) and moderate price.

SOUVENIER de MAXIME CORNU – (Henry – 1919)
The bloom is full double, bright yellow shaded rose (almost a peace rose-colored tree peony), and a vigorous, many-stemmed plant of medium height.

ALICE HARDING – (Victor and Emile Lemoine – 1935)
This is a full double, ball-shaped, clear, sulfur yellow bloom having a marvelous fragrance, on a stocky, vigorous plant. The period beginning September 1st, and ending about October 15th, is the most favorable for peony planting in the Denver area. Secure catalogs now, order plants, specify delivery date, plant promptly on arrival, and join the progressive gardeners' parade.

SOURCES

*Correctly labeled plants may be obtained from the growers listed below. A price and variety list or catalog may be obtained by letter or postcard.
MISSION GARDENS, TECHNY, ILL. 60082
BEN GILBERTSON, KINDRED, NO. DAK. 58051
SILVA SAUNDERS, CLINTON, N. Y. 13323
WILLIAM GRATWICK TREE PEONIES, PAVILION, N. Y. 14525



The "ROCKBREAKERS" et al.

A VERSATILE FAMILY

Ernest H. Brunquist *

"The saxifrages are among the jewels of the mountain flowers. I think of the cluster of dainty dotted saxifrage by a crystal pool in a high pass, of the fringed Parnassia lighting up dark corners in shaded mountain valleys, and the exquisite purple one."

(Boykinia). – Ruth Ashton Nelson

Amateur botanists interested in wildflowers for the sheer pleasure of it are likely to be partial to certain plant families. This article suggests that *Saxifragaceae,* the saxifrage family, is particularly worthy of con-



PURPLE SAXIFRAGE
Telesonix jamesii



SNOWBALL SAXIFRAGE
Saxifraga rhomboidea

* Denver Museum of Natural History

sideration. The name, of Latin derivation, means "rock-breakers." Many of the species, but by no means all, are intimately associated with rocks.

The earliest reference to members of the family seems to have been that of Dioscorides, a Greek medical writer of the first century A.D. The queer "doctrine of signatures" was prevalent, and the Romans concluded that because saxifrages "split rocks," extracts of the plant would be effective for breaking up kidney and bladder stones!

The family is cosmopolitan in distribution but preponderantly of the north temperate zone, with many arctic and alpine species (some are circumpolar,) and some xerophytes. Worldwide there are said to be about 1200 species in 80 genera. It is an extremely variable family with little rule-of-thumb consistency in structural detail of petals, stamens, ovaries and leaves. The ovary, for example, varies from being inferior in some cases, half inferior, or even quite superior. Taxonomists have found it difficult to separate from other families, especially *Rosaceae.* On the whole, Colorado species show a preference either for rocky situations – ledges, crevices, and the like – or for damp or boggy places with the soil rich in humus.

AMATEUR-BOTANIST EXPERIENCE

Botanists, new and veteran, are attracted to the family for a variety of reasons. Asked why they feel as they do, they have given answers such as the following:

- "Because of the beautiful detail of the tiny flowers revealed by a hand lens." Mitrewort and alumroot are cited. Of course this is true of practically any plant family.
- "Bright green, scalloped leaves are strikingly beautiful." e.g., alumroot, and brook saxifrage.
- "Some species have an adventurous air about them, unable to decide what genus to join." For example, purple saxifrage, once a member of *Boykinia,* and then of *Saxifraga,* is now in the genus *Telesonix.*
- One student regretted that there weren't classifiers (taxonomists) around "during the millions of years plants were evolving. Then we would be better able to decide who belongs to what family."

With such reactions in mind, what typical examples of the family may be cited for oncoming amateurs who would like an introduction to the family? A selection of fairly common wild species is given below as representative of six of Colorado's genera. This is by way of an introduction to the more complete descriptions of H. D. Harrington ('64), William A. Weber ('67), and Ruth Ashton Nelson ('69, '70). Beginners are urged to learn to identify plants for themselves by the use of the *keys* to be found in these books. Many have found it a

rewarding and fascinating procedure (they call it a "game" sometimes), and incidentally a short-cut to familiarity with the terminology of botany and details of flower and plant structure.

It is virtually impossible to describe the family in a condensed and meaningful way for an amateur. Using keys to families, one comes to *Saxifragaceae* 5 times when using Harrington's coverage for all of Colorado, and 3 times when Weber's coverage for a part of the state is used.

References are given to illustrations of some species. Pictures are sometimes more effective than many words for preparing a student to recognize characteristics of a genus or species.

This article follows Weber, one of the professional botanists who exclude the woody genera which are sometimes included in the family. Thus the genus *Ribes* (currants and gooseberries) is assigned to *Grossulariaceae,* and the genus *Jamesia* (waxflower, or cliffbush) is assigned to *Hydrangeaceae.*

The following summary of major differences between the six genera selected for this introduction is essentially that of Harrington as simplified by Ruth Ashton Nelson ('69).

A. Stamens 10; flowers white, yellow, or rose to purple
 a. Leaves entire, lobed or toothed, never dissected
 i. Flowers white or yellow: *Saxifraga* (Saxifrage)
 ii. Flowers deep rose to purple: *Telesonix* (James or purple saxifrage: *Boykinia)*
 b. Leaves and petals dissected; flowers white or pinkish: *Lithophragma* (woodland-star, or fringecup)

B. Stamens 4 or 5; flowers white or greenish
 a. Flowers relatively large, one to a stem; clusters of gland-tipped filaments alternate with the fertile stamens: *Parnassia* (grass-of-parnassus)
 b. Flowers in elongated clusters; no gland-tipped sterile stamens
 i. *Petals* lobed or dissected; flowers few; inflorescence a raceme: *mitella* (mitrewort, bishops cap)
 ii. Petals entire; flowers many; inflorescence paniculate, sometimes diffusely branched, sometimes narrow and spikelike: *Heuchera* (alumroot)

Heuchera (Alumroot)

Worldwide the genus has about 30 species. At least 5 have been found in Colorado, all of them rock-cohabiting. They occur more abundantly than species of the other genera, at least in central Colorado. The name, alumroot, refers to the astringent taste of the root.

The leaves are mostly basal and long-petioled; more or less orbicular in shape, and shallowly lobed as well as toothed. For four of our species the width of the blade varies from less than 1/2 inch to somewhat over

2 inches. The *flowering stems* are especially characteristic of the genus. They are conspicuous because the leaves are chiefly basal. Among our five Colorado species stem length varies from about 4 inches to 2 feet. *Inflorescences* vary from paniculate to spikelike and narrowly cylindrical. They are strongly one-sided (secund) in common alumroot (see below). The white or greenish *petals* are tiny and entire; often more or less clawed (i.e., narrow at the base). The *ovary* is partly inferior, with the calyx tube fused to its lower portion. It develops into a 2-horned capsule.

Illustrations: (1) *H. parvifolia;* Weber '67, p.278 and Clements & Clements, p.197. (2) *H. bracteata:* Roberts & Nelson, p.24. (3) *H. hallii:* Nelson '69, p.152, and Clements & Clements p. 197.

The following are two particularly common species of the genus.

Common Alumroot (Heuchera parvifolia). Common in rocky situations but also found growing in woods. It ranges from the plains into the alpine zone. The teeth of the 5-to 9-lobed leaves are relatively *blunt.* The flowers are flat-campanulate, and the sepals only slightly exceed the flat hypanthium (see diagrams, pp.12-13, Weber '67.) Stamens *do not protude.* Flowers occur in separated clusters on stalks 10 inches to 2 feet long.

Bracted Alumroot (Heuchera bracteata). The plants are mostly confined to rocky situations, and range from the plains to the subalpine zone. Leaves are bright green, with 5 to 7 lobes which are *sharply* toothed. Flowers are small and greenish, in clusters along one side of the scaly but leafless stalks, which are 4 to 8 inches tall, and thus shorter than the average in common alumroot. In mature flowers the stamens are longer than the petals, and *protrude.*

Saxifrage *(Saxifraga)*

This is the largest genus of the family in number of species. World-wide there are close to 300, of which about 16 occur in Colorado. In some species the stems are leafy, in others the leaves are all basal. The smallish flowers are perfect, and are either solitary or occur in cymes or panicles. The 5 petals are sometimes clawed, sometimes clawless. 10 stamens. The ovary varies from superior to partly inferior.

The following is a condensation of the major distinguishing features of 8 species selected as representative of the genus. They may be divided into three main groups: (1) Species with yellow petals; (2) Species with white petals and all of the leaves basal; (3) Species with white petals and some small stem leaves in addition to larger basal ones.

A. *Petals yellow*

Golden, Yellow Alpine, Fairy, or Goldbloom Saxifrage (Saxifraga serpyllifolia. Formerly *Saxifraga chrysantha)*

Illustrations: (1) Nelson '69, p.155; (2) Nelson '70, p.76; (3) Willard & Harris, p.22; (4) Pesman '59, p.31; (5) Clements & Clements, p.190.

Tiny smooth alpine plants with rosettes of small basal leaves (less than 1/2 inch long). Stems often 1 to 3 inches tall, with smaller leaves.

The golden-yellow flowers (1 to 3 to a stem) are "relatively large." The petals average about a quarter of an inch long, are short-clawed, and are often speckled with orange spots. Plants of rocky and gravelly places.

Whiplash, or *Stoloniferous Saxifrage (Saxifraga flagellaris)*

Illustrations: (1) Willard & Harris, p.22; (2) Nelson '70, p.76; (3) Clements & Clements, p.190.

The plants are very glandular-pubescent, with definitely leafy stems which are likely to be 2 to 6 inches tall. Rosettes are formed by oblong-spatulate leaves which are glandular-hairy on the edges. *Runners* extend from the base of the plant and take root to form satellite rosettes. Petals are "relatively large" (up to about 1/3 inch long) short-clawed and yellow. Often in rocky places; subalpine and alpine.

B. *Petals white and all the leaves basal.*

Snowball, or Diamond leaf Saxifrage (Saxifraga rhomboidea)

Illustrations: (1) Nelson '69, p.154; (2) Willard & Harris, p.11; (3) Craighead and Craighead, p.76; (4) Pesman '59, p.135; (5) Roberts & Roberts, p.27; (6) Nelson '70, p.76.

Stout leafless flower stalks rise flat rosettes of short-petioled leaves (rhomboid in shape) which are often 1 to 2 inches long, and are shallowly toothed. The white flowers are in terminal clusters, tightly packed at first. The plant occurs in a variety of soils and ranges from plains into the alpine zone. It is an early-spring bloomer.

Brook Saxifrage (Saxifraga odontoloma. Formerly S. *arguta)*

Illustrations: (1) Weber '67, p.280; (2) Nelson '69, p.154; (3) Craighead & Craighead, p.75; (4) Clements & Clements, p.190.

This, our tallest species (up to about 20 inches) is a plant of moist places, often streamside. The blades of the long-petioled basal leaves are nearly round; shining-green; coarsely toothed; and cordate at the base. The small white flowers are borne in a loose, bushy panicle; sepals are reflexed; and stamens prominent. The plant ranges from montane to subalpine. "An all-around charming plant."

C. *Petals white and there are smaller stem leaves in addition to larger basal ones.*

Dotted, or Spotted Saxifrage (Saxifraga bronchialis)

Illustrations: (1) Nelson '69, p.154; (2) Weber '67, p.281; (3) Nelson '70, p.76; (4) Craighead & Craighead, p.75; (5) Clements & Clements, p.190.

If you find matted plants: (a) with flower stalks which rise from compact rosettes of rigid, awl-shaped leaves which are spine-tipped and spine-edged; (b) with smallish white flowers in loose, few blossomed panicles; and (c) with petals usually with tiny purple or orange spots, you may be certain that you have this species. The basal leaves average a little over 1/2 an inch in length and the stems (averaging about 4 inches tall) have a few smallish leaves. The species range from foothills to above timberline, and is found in coniferous forests as well as rocky places.

Nodding Saxifrage (Saxifraga cernua) The most prominent featur are the occurrence of small *reddish bulbs* in the axils of stem leaves, an a single white, relatively large terminal blossom. The rather long-petiole lower leaves are broadly kidney-shaped; palmately 5- to 7-lobed. Plan not mat-forming. It is a rock-loving species and is described as "freque along snow-runoff rivulets, alpine and subalpine" (Weber). (Hopeful there will be an illustration in the next edition of one of the abov mentioned books.)

Matted, Tufted, or Alpine Saxifrage (Saxifraga caespitosa)

Illustration: Clements & Clements, p.197.

Here again is a tiny and exclusively alpine mat-forming specie Deeply and narrowly 3-cleft basal leaves are practically diagnostic. Stem vary from about an inch to 3 inches tall, with 1 or 2 stem leaves. Flowe – 1 to 4 to a stem – are small and white, with petals about 1/8 inch lon

Pygmy or Weak-stemmed Saxifrage (Saxifraga debilis)

Illustration: Clements & Clements, p. 197

The thin, conspicuous 3-lobed leaves are diagnostic. The inflorescenc is an open cyme of 2 to 5 moderately small flowers. The leafy stem average about 4 inches in length, and the plants are loosely tufte Found in rocky situations, commonly in the shelter of boulders; subalpin and alpine. "A delicate, fragile-looking plant."

James, or *Purple Saxifrage; Boykinia (Telesonix jamesii)*

Illustrations: (1) Nelson '69, p.155; (2) Craighead and Craighead, plate 8 (3) Pesman '59, p.68; (4) Clements & Clements, p.191 (colored)

This species was formerly assigned to *Saxifraga* or to *Boykinia* The rather large rose-red to purple petals (the longest about 3/8 inch are particularly distinctive. Their long claws are so slender that there ar conspicuous spaces between their bases. Brightly green leaves (basal a well as stem leaves) are long-petioled and the roundish blades are 1 to inches wide and coarsely toothed. Stems are likely to be at least 4 to inches tall. The inflorescence is described as "a crowded paniculat cyme" (Harrington) and "an oblong cluster of flowers" (Clements & Clements). Weber ('67) states that the plant is abundant along the co railway near Windy Point on Pikes Peak and at one locality in Rock Mountain National Park.

Woodland Star, or Starflower (Lithophragma)

Illustrations: (1) Nelson, '69, p.151; (2) Craighead & Craighead, plate 8 (3) Clements & Clements, p.197.

Three species have been described for Colorado, two of which hav been described by Weber '67 and Nelson '69, '70. Distinguishin features are 10 stamens and *dissected* leaves and petals. Flowers ar white or pinkish. Stems are from 4 to 12 inches, and are leafy, althoug most of the leaves are basal. Leaves are petioled, with blades whic

are suborbicular or reniform in shape, palmately lobed or cleft. Flowers are borne in mostly few-flowered racemes. The petals, 5 in number, are deeply and somewhat irregularly cleft into 3 to 7 slender, pointed divisions. One species, *Lithophragma glabrum,* rather rare, is distinguished by having some of the flowers replaced by purple bulblets, and the entire plant is sometimes tinged with purple. Subalpine.

Grass-of-Parnassus (Parnassia)

Illustrations: (1) Weber, '67, p.279; (2) Nelson '69, p.151; (3) Craighead & Craighead, plate 8; (4) Pesman '59, p.93; (5) Clements & Clements, p.197.

Colorado has 2 of the approximately 44 species of the world. The species are plants "of marshes and wetmossy places" (Nelson). The orbicular or oval leaves are entire (that is, neither lobed nor toothed), and all are long-petioled and basal except for a small single one on each flower stalk. The 5 anther-bearing fertile stamens alternate with clusters of gland-tipped staminoidea. Each stem bears a single white flower. The petals of the more common species, *Fringed Parnassia (Parnassia fimbriata)* are rounded, clawed, and *fringed* at the sides. Flowers are about an inch in diameter. "A striking and unique species."

Mitrewort, or Bishops Cap (Mitella)

Colorado has 3 of the 12 species reported for the world. There is exceptional variability within the genus. Even among our species, the stamens are either opposite to the petals and alternate to the calyx lobes or vice versa; the calyx lobes are either greenish or white; and the petals are *pinnatifid,* 3-cleft, 3-toothed, or (rarely) entire. Some authors have taken our three species from *Mitella* and put each one into one or the other of two other genera!

Illustrations: By far the best, in fineness of detail, is that of Nelson '69, p.152 *(Mitella pentandra.)* The same species is illustrated in Clements & Clements, p.197.

Our commonest species is alpine bishops cap *(Mitella pentandra).* "It is common in deep shade in forests, subalpine," according to Weber. Mrs. Nelson ('69) calls it "a plant of moist, shaded forest banks . . . usually found around springs or seepage areas . . . often growing in moss along with the tiny Twayblades and 1-Leaved Bog-Orchid." The round-cordate leaves (all basal and in a rosette) are shallowly 3-lobed and toothed. The leafless flower stalk ends in an elongated raceme of rather widely separated small green flowers. The petals are *pinnatifid,* "Imagine finding petals mimicking snowflakes!"



1. *Clements, Edith S. Flowers of Mountain and Plain,* 1915. The first edition consisted of the 25 color plates (of paintings) from the book *Rocky Mountain Flowers* by Clements & Clements (see below), representing 175 species. A simple text description of the species was added in the second edition. The last of several reprintings was published in 1955, and the book is currently available.

2. *Clements, Frederic Edward & Clements, Edith Schwartz, Rocky Mountain Flowers: An illustrated guide for plant-lovers and plant-users.* 1914. There are 25 plates in color and 22 plates in black and white. With few exceptions the illustrations in color were painted in the field; the line drawings were largely from herbarium material. Dr. Clements was Associate in Ecology, Carnegie Institution of Washington, D.C. and Director of the Pikes Peak Alpine Laboratory, where he and his wife were associates in field studies and research. There are keys for identification purposes and a detailed description of families and genera. A flower chart to show evolutionary plant-family relations was added to the third edition in 1928, and the third reprinting of this is still available in book stores.

3. *Core, Earl L., Plant Taxonomy,* 1955. Particularly valuable for data regarding world families, genera and species, and their distribution.

4. *Craighead, John J., Craighead, Frank C., Jr. & Davis, Ray J., A Field Guide to Rocky Mountain Wildflowers from Northern Arizona and New Mexico to British Columbia,* 1963. The first named is professor of Zoology and Forestry at Montana State University and leader of the Montana Cooperative Wildlife Research Unit, U.S. Fish and Wildlife Service; the second is a Wildlife Research Consultant with the National Geographic Society and a Research Associate at Montana State University. Ray J. Davis is professor of Botany at Idaho State University. The color plates (photographs) are by the authors, and the drawings by Grant O. Hagen and Edwardo Salgado. There are no keys. The book is definitely selective; thus only certain species of 3 genera of the Mustard Family are described and 10 species of the Saxifrage Family. Plant descriptions are often extensive and exceptionally interesting.

5. *Harrington, Harold D. Manual of the Plants of Colorado,* 1954. This large volume is the only manual which included all of the species known for the state in 1954. Ferns and their allies, and Gymnosperms are included to make a total of 117 families, 693 genera, and 2794 species, all but 242 species of which are described in detail. There are extensive keys, but no illustrations. There is an 8-page description of "Vegetation Zones in Colorado" by David F. Costello. Dr. Harrington was for many years a member of the faculty of Colorado State University and curator of the Herbarium. Many a botanist has said "This is our bible!"

6. *Nelson, Ruth Ashton, Handbook of Rocky Mountain Plants,* 1969. Drawings are by Dorothy V. Leake. The region covered includes parts of Colorado, Montana, Idaho, Wyoming, Utah, Arizona and New Mexico, including 11 National Parks and Monuments. The keys are especially tailored for amateurs. Illustrations include 362 line drawings of individual plants, photographs in color of 76 species, and many diagrams illustrative of details of flower structure. Considerable attention is given to the ecological aspects of the zonal distribution of the

flora. The book is dedicated to Aven Nelson, "inspiring teacher, faithful friend, and beloved companion." Mrs. Nelson keeps in touch with the point of view of the amateur.

Nelson, Ruth Ashton, Plants of the Rocky Mountain National Park, 1970 is a publication of the Rocky Mountain Nature Association in cooperation with the National Park Service, U.S. Department of the Interior. Earlier editions, the first in 1933, were published directly by the Government. About 850 species of plants are described; specimens of most of them are in the herbarium of Rocky Mountain National Park. There are 174 reproductions of photographs, most of them in color. Considerable attention is given to a variety of ecological situations. The glossary is illustrated with line drawings, and there is a topographic map with an index of major localities of the Park.

Pesman, M. Walter, Meet the Natives, 1967 (7th edition.) This continues to be the favorite book of many beginners, and is currently available. The author, a landscape architect, was long prominently active in the Colorado Forestry Association and the Denver Botanic Gardens. He was a leader in planning and executing the landscaping of Denver public school buildings. The Mt. Goliath alpine-subalpine trail of the U.S. Forest Service and Denver Botanic Gardens bears his name.

Roberts, Harold D. and Roberts, Rhoda N., Some Common Colorado Wild Flowers, 1953. Pictorial #8, Denver Museum of Natural History. The transmountain Harold D. Roberts Tunnel is named in honor of this Denver attorney who was a specialist in the field of water rights and resources. The booklet has photographs of 50 plant species reproduced in color, each with a half-page description partly botanical and partly a record of personal experience and reactions. There are pictures illustrative of the plant zones of Colorado and also diagrams of details of leaf and flower structure.

Roberts, Rhoda N. & Nelson, Ruth Ashton, Mountain Wild Flowers of Colorado, 1957. This Pictorial #13, Denver Museum of Natural History, is dedicated to the memory of Harold D. Roberts. There are reproductions of the colored photographs of 50 species, each with a half-page of descriptive material, botanical and delightfully personal. There is also a series of pictures of forest types and zonal vegetations.

Weber, William A., Rocky Mountain Flora: A field guide for the identification of the Ferns, Conifers and Flowering Plants of the Southern Rocky Mountains from Pikes Peak to Rocky Mountain National Park and from the plains to the Continental Divide, 1967. This is a revised and illustrated version of the author's *Handbook of Plants of the Colorado Front Range,* published by the University of Colorado Press in 1953 and revised in 1961. The illustrations are by Dr. Charles F. Yocum of Humboldt State College, California. We are informed that about 1,400 species of plants, or almost one-half of the total number found in Colorado, occur in the Front Range. The area of the Rocky Mountains, says Dr. Weber, "is an intricate mosaic of altitudes, slopes, exposures, microclimates and ecological gradients of all sorts and the distribution of plants mirror this complexity." The book is generously illustrated with black-and-white drawings of species which are often more helpful for identification purposes than photographs. The glossary has many diagrams and sketches. Keys plus the illustrations make the manual the best we have for the portion of Colorado which it covers. Dr. Weber is professor of Natural History and curator of the Herbarium, University of Colorado.

12. *Willard, Bettie and Harris, Chester O. Alpine Wildflowers of Rocky Mountain National Park,* 1969. This, now in a 5th printing, is another publication of the Rocky Mountain Nature Association in cooperation with the U.S. National Park Service. Fifty species are shown in full color in their natural settings. The pamphlet is the first of its kind on alpine plants of the United States. It is an adventure in high altitude ecology and is to a large degree the product of Dr. Willard's personal research and appreciation.



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The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

AUTUMN 1971



THE COVER

Aechmea x Red Wing

Drawing by Sandra Blizard

THE GREEN THUMB

VOL. TWENTY-EIGHT, NUMBER FOUR

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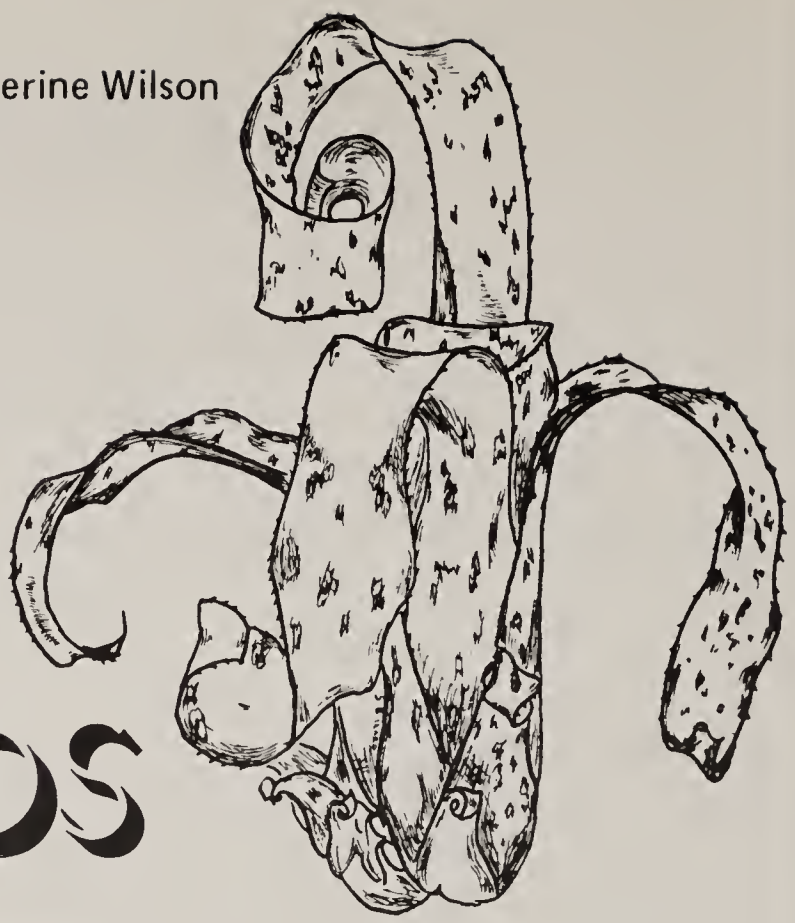
MARGARET SIKES, *Editor*
AUTUMN 1971

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Billbergia x Catherine Wilson

THE BROMELIADS

Sandra Blizard

The *Bromeliacae* form a large family of plants from the tropical and sub-tropical Americas. Although they are cultivated all over the world, bromeliads are originally from the gulf coast regions of North America south through Mexico, Central and South America to half way down Argentina. The Andean area is said to have mothered the family. The only non-American species of brom is found on the west coast of Africa. It is of the genus *Pitcairnia.*

Some, like the pineapple genus (*Ananas*), are terrestrial, and relatives such as Spanish moss *(Tillandsia usneoides)* are epiphytes that can live entirely without soil, deriving moisture from fog and rain and nourishment from animals and blowing debris. Epiphytic bromeliads get nothing from the trees, rocks, or cacti on which they sometimes live except a foot-hold on which to grow. They are epiphytes not parasites.

The life cycle is also somewhat unique. Bromeliads reproduce from seeds and by offsets, the babies that form at the base or in the leaf axils. The time necessary to reach maturity, depending on the species, varies from about one year to an estimated 150 years. Upon maturing the plant blooms and eventually the mother plant will die. The individual brom plants only bloom once. There are a very few exceptions to this rule. In their favor is the fact that the blooming coloration of the plant may last up to ten months, depending on the species. All bromeliad flowers have three petals.

Different species have adapted to various types of climates. Some adapt to the windy, cool mountains while others enjoy the humid rain forest of the lower Amazon basin. Many species that grow in the more moist areas have leaves forming rosettes with the central part making a cup which holds water. Other things can be found in the cups such as insects, frogs, snakes and algae. Many of these tenants spend their whole life cycles in the same clump of broms.

Broms that grow in less moist and shaded places have thicker and tougher leaves. Many have scales on their leaves to retain moisture and food and to insulate them from the sun and wind.

Bromeliads are sub-divided into three sub-families. The first is the *Pitcairnioideae* which includes the genera *Dyckia, Hechtia, Puya* and *Pitcairnia.* Of these *Dyckia* and the small types of *Hechtia* are most often used in the home or home greenhouse.

Dyckias are rather small, spiny plants that grow well with cacti and succulents in a bright window. Their natural home is the sunny areas of Brazil, Argentina and the neighboring countries. They have frosty looking scales on their rather tough daggerlike leaves. The orange or yellow flowers bloom on a tall spike a few at a time.

Hechtias enjoy growing among rocks in the sun. They also form a spiny rosette and in good strong light the gray scaled leaves take on rosy-bronze coloring. Their tall flower spikes produce small white flowers.

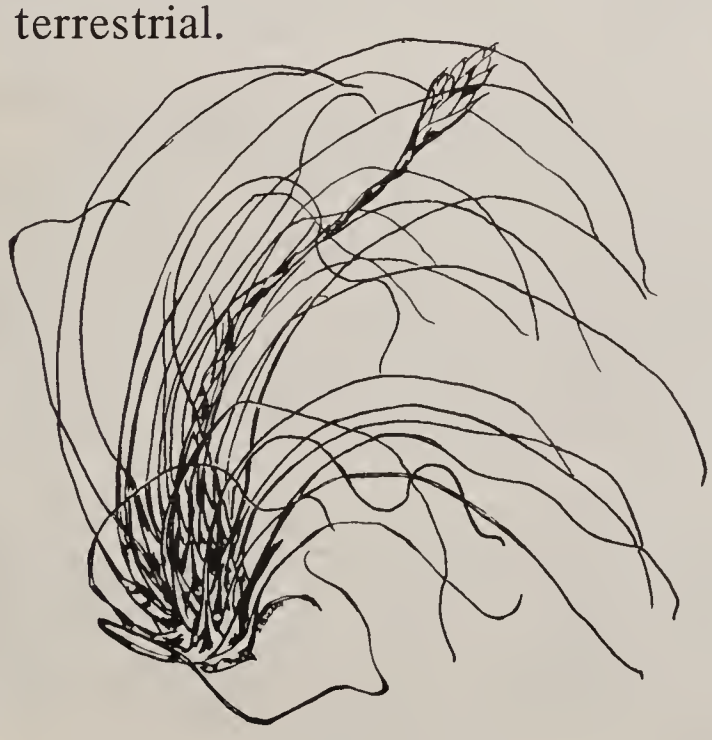
The *Pitcairnia* is generally a grassy-leaved plant with some species having beautiful inflorescences.

Puya has a few species small enough to cultivate indoors. However, the really remarkable *Puyas* are the large types (to 30′). They have been called the "Dinosaurs of Plants", as they live to an estimated 150 years, in which time they bloom, reproduce and die. They are becoming extinct, as they are found only in a limited area in Peru and one place in Bolivia.

Sub-family number two is the *Tillandsioideae.* Genera in this sub-family include *Tillandsia, Vriesea, Guzmania,* and *Catopsis.*

Tillandsia, the largest genus of all with over 400 species, has some of the most unusual forms. Many do not look real, some weird, and some of great beauty.

The smallest has leaves ¼ inch long *(Tillandsia tricholepsis)* and others like *T. grandis* whose leaves are up to 6 feet in length, and whose inflorescence is 10 to 12 feet tall. The *T. tricolepsis* and most other *Tillandsias,* are epiphytic but the *T. grandis* and some others are saxicolous or terrestrial.



Tillandsia juncea



Tillandsia seleriana

All members of this group have spineless, smooth edges on the leaves. The leaves may be smooth and flat or round and fuzzy. The lavender-purple to blue flowers and pink to hot pink flower bracts form quite a striking combination. One of the exceptions is *T. xiphioides*, a small charmer with open, ruffled, white flowers that are fragrant.

Seeds of the *Tillandsias* have little silky feather-like parachutes which are carried by the air.

Many of the dryer-growing *Tillandsias* have no basal leaf water reservoirs so they are covered with gray peltate scales. This type is very good for home growing as they adapt to home conditions well. They are best mounted on tree fern (*hapu*) or tree limbs. Some *Tillandsias* that are interesting and easy to grow are *T. ionantha, T. seleriana, T. juncea,* with *T. streptophylla* being an all time favorite of many people.

The leaves of most *Vrieseas* are thin, shiny and spineless. All have leaf reservoirs for holding water. They prefer some shade and most are epiphytic. The flowers are either white or yellow with a tubular shape. Each individual flower lasts a day or two. Many times the colorful flower bracts hold their color for several months. They will adapt to pot culture if the potting medium is loose and drains well.

Guzmanias are similar to the soft-leaved *Tillandsias* and the *Vrieseas.* They are mostly epiphytic and can be treated as the papery leaved *Vrieseas.* The flowers are yellow or white, borne in unusual red bracts held above the foliage. Although *Guzmanias* are from high-altitude areas they require more humidity than is normal in the Denver area. If this need can be filled, the unusual flowerheads and shiny, colorful foliage of many types would be of interest for the homegrower.

Sub-family three is the *Bromelioideae* which includes the greatest number of genera and has more different forms represented than the other two. In this group the *Aechmea, Billbergia,* and *Portea* are generally epiphytic. Also in this sub-family are the terrestrial types: *Ananas, Bromelia, Cryptanthus, Neoregelia,* and *Orthophytum.* There is an interesting monotypic genus called *Acanthostachys* in the group.

Billbergias and *Aechmeas* are probably the best known genera and are usually the first to come to people's attention.

The tubular shaped *Billbergia* plant can be grown easily in a well drained mixture by almost anyone. The offsets are produced readily in most species and mature and bloom in a year or so. Leaf color ranges from plain green to bronze tones to rose-red with spots or bands of contrasting color. Many have bands of silvery-white scales to beautify them. The nodding scape bracts are usually hot-pink to red, framing blue tipped green to yellow flowers. The influorescence lasts between one and two weeks.

Aechmeas are the back-bone of any collection of broms. More diversified in plant form and flowerhead types, they hold scape color for months. After they bloom the berries set, if fertile, and go through changes of color over a period of time. *Aechmeas* and *Billbergias* are good subjects for people who grow plants under fluorescent lights.



Neoregelia ampullacea

Cryptanthus, the small "earth stars" are available in many colors although the little white flowers are not spectacular. The form is different from other types and the thick texture of crypts, like *C. fosteriana,* with their burgundy-brown color and silvery scales making wavy bands across the leaves will endear them to all those who see them. They are terrestrial and work well in terrariums and dish gardens. Light from the north window will usually be enough to keep their color.

Ananas comosus is the name of the commercial pineapple. This plant grows fairly large for the home, but one, *Ananas ananasoides var. nana,* is small and would be suitable. It will take three to four years for *A. comosus* to mature and it requires *good* light to bloom and set fruit.

For those who live in south Texas and southern California, *Bromelia* is a genus to grow outside. The plant is large and the leaves look like swords with huge curved spines that go in different directions. In its native habitat it is sometimes planted in place of fences as nothing can go through it. When *Bromelia balansae* blooms it is quite unforgettable. The normally dark green leaves turn bright red in the center giving it its name "Heart of Flame". The compact, woolly, 2 foot flower head has rose flowers margined in white. If you have enough room and bright sun it might be worth the try in this area.

Acanthostachys strobilacea is an epiphyte with long, slender, whip-like leaves. The flower head looks like a tiny pinecone or pineapple. The flowers are yellow and the bracts are orange in good light. The flowerhead shape lasts for a very long time after color fades. Again, this species adapts well to pot culture as long as there is excellent drainage.

Considering the natural habitat helps one to understand the requirements of certain bromeliads for use as houseplants. It has been said that life forms grow in strata as uniform as those in rocks, and this is exemplified by the broms that grow in three or four stories in the jungle. In the densely shaded areas on the ground floor are the *Neoregelias, Nidulariums,* and *Canistrums.* They require moisture and shade and are less adaptable to abrupt changes of temperature and light than the broms that grow

farther up. The lower types usually grow terrestrially.

It is noted that the lower the brom grows the less spectacular the bloom is and they are often formed in the cup as opposed to having a spike. The plant may color up or have pseudo leaves or bracts to attract the insect pollinater. Using these types in the home one can usually depend on them to hold their color for a long while.

In the next strata of the jungle, small trees form the second story. Many species of *Billbergia, Aechmea,* and *Vriesea* grow here. These types need more light than the ground floor types do, and they do not depend on the intense moisture either. This type can adapt itself to home or greenhouse culture quite well.

Up in the third floor the tougher types of *Aechmea* dominate but there will be found *Tillandsias* and *Vrieseas* also. This area, among the great limbs of the towering forest trees is beautifully described by Mulford and Racine Foster in *Brazil, Orchid of the Tropics.* The following sentences are adapted from their writings: In southern Bahia in a primeval forest, we discovered giant plants completely at ease fastened securely in their high positions on limbs almost as large as ordinary trees, 80 feet up from the ground. The trees in which they live are often 8 to 10 feet in diameter. It took from one to two hours to reach those plants and loosen them from their secure quarters. Lowering them with ropes, it was discovered the plants with several offshoots would weigh from 100 to 125 pounds. In this mass plenty of other life forms could be found, including frogs, snakes, and beetles, aquatic mosses and algae, as well as 1 or 2 gallons of water.

The fourth story is open and exposed to drying by sun and wind. The few broms that live here are stiff-leaved and resemble plants growing in arid regions. Although the annual rainfall is large, the time between rains is sometimes long, and moisture from the soil is not available to the epiphytic broms as it is to the terrestrial plants.

In the last several years Bromeliads have been grown by the commercial growers more and more. Types that used to be very difficult to acquire are found in the catalogues more often.

Twenty-one years ago the Bromeliad Society, Inc. was formed. Since then people all over the world have become interested in the family, and affiliated societies have been busily forming. Since February, 1971, when the organizational meeting was held, there has been a new and growing Rocky Mountain Bromeliad Society. The R.M.B.S. was started to provide a forum to encourage interest in bromeliads. Programs and activities include presentations of cultural information helpful to the first-timer or advanced grower, acquisition of plants for members, shows and exhibits, and a discussion of mutual problems. The R.M.B.S. publishes a monthly bulletin and regularly scheduled monthly meetings are held at the Denver Botanic Garden on the first Sunday of the month at 2:00 PM. For further information contact Sandra Blizard, 364 West Fremont Ave., Littleton, Colorado, 80120.



Exotics of COLORADO

Ginnala Maple,
Acer ginnala

Helen Marsh Zeiner

Amur or ginnala maple, *Acer ginnala* Maxim., is a shrubby maple grown primarily for its beautiful fall color. Its bright red leaves can be seen in many places in Denver in the autumn.

Ginnala maple is classed as a large shrub (over 6 feet tall) or a small tree growing to 20 feet in height. Graceful when young, this slow-growing maple may become open and somewhat scraggly with age. It is frequently suggested for tall, informal hedges. It is also used as a specimen plant or it can be planted in clumps for screening purposes and for display of fall color.

Ginnala maple is a native of Manchuria, northern China, and Japan. It was introduced into the horticultural world about 1860 and has become a well-known and popular cultivated maple because of its size and its attractive leaves.

It clearly shows its relationship to our North American maples and to other familiar cultivated maples not native to this country. All maples are members of the genus *Acer*, the largest and most important genus in the maple family, *Aceraceae*. *Aceraceae* is a comparatively small family consisting of only two genera and about 120 species, mostly trees but with a few shrubby representatives. *Acer* is the classical Latin name for maples; *ginnala* is the common name given to this particular maple in its native habitat.

Maples are characterized by long-petioled opposite leaves, usually simple and palmately lobed with three to seven lobes. An exception to the simple leaf is the box elder, *Acer negundo* L., which has opposite pinnately compound leaves.

The leaves of ginnala maple vary from 1 to 4 inches long, and are three-lobed with the central lobe much longer than the lateral lobes. This elongated terminal lobe is a good identifying characteristic for ginnala maple, and will always distinguish it from our native Rocky Mountain or dwarf maple, *Acer glabrum* Torr., another small maple sometimes planted as an ornamental.

Leaves of ginnala maple are doubly serrate, glabrous, dark green above and a lighter green on the under surface. Attractive during the summer when green, the leaves are outstanding in their autumn scarlet.

Maple fruits are very characteristic and are commonly known as "keys". Each "key" is a pair of one-winged samaras loosely joined at the base. The degree of divergence of the elongated, one-sided wings is a species characteristic. In ginnala maple the wings are nearly parallel. As they mature, the fruits of ginnala maple may (but do not always) take on a red or yellow color.

The flowers of ginnala maple are small, yellowish, fragrant, and borne in long-stalked panicles. Each flower produces one "key".

Ginnala maple's value is as an ornamental. Other maples are also planted as ornamentals and are desirable large shade or street trees. In addition to their use as ornamentals, the large maples are also valuable in other ways. One example is the sugar maple, *Acer saccharum* Marsh., which is an important source of high-grade lumber for building, for furniture, and for miscellaneous uses. The sap of sugar maple is the source of maple syrup and maple sugar, an important contribution to the economy of some of our northeastern states. Sugar maple is also interesting ecologically for its role in the beech-maple forests of the northeastern United States.

AWARD WINNERS OF 1971
All-American Rose Selections

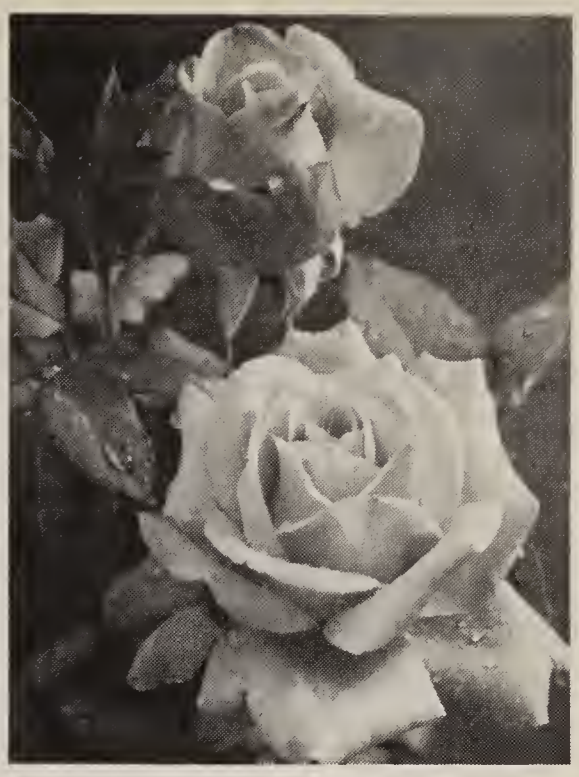
Beverly M. Pincoski

All-America Rose Selections (AARS) is a non-profit organization whose sole function is to test new rose originations and to give recognition in the form of an All-America award to the roses which have proved outstanding in the trials. There are 24 official test gardens in the United States, one of which is located at Denver Botanic Gardens. Roses, entered by number only, are trial grown under actual garden conditions for two years. During this period they are judged on foliage, bud and flower form, opening bloom color, finishing bloom color, floriferousness, substance, fragrance, stem, growth habit, vigor, hardiness and disease resistance. Only a very few roses pass this rigorous test and are named All-America Rose Selections.

Of all the fine new rose hybrids entered into the stringent two-year trials, only two emerged as 1972 winners of the coveted awards. Plants will be offered for sale next spring.



Apollo



Portrait.

APOLLO is a hybrid tea rose of soft sunrise yellow gradually deepening to a canary yellow. The flowers are usually borne individually on long stems quite free of thorns. The fragrant blooms, usually of 30-35 petals, are large, often attaining a diameter of 5 inches. Apollo will produce superb buds and blooms for exhibition purposes.

The foliage of this rose is a dark rich green, disease resistant, and covers the plant well thus producing a fine background to set off the gorgeous blooms.

This award winner is the result of a cross between High Time and Imperial Gold by David Armstrong.

For the first time in the 32 years that the AARS has been making awards, an amateur has invaded the sacred precinct of the professionals and won an honor that has hitherto been exclusively theirs. Carl Meyer, of Cincinnati, Ohio, a pipe-fitter by trade, hybridized PORTRAIT. His success should encourage every amateur rose hybridizer in the country.

Portrait is a distinctive, colorful, warm, radiant pink hybrid tea rose. The urn shaped, deep pink buds open to a soft almost creamy white bloom, edged with a deep satiny blush pink.

The fragrant flowers are borne on sturdy stems of medium length and last for long periods when cut or on the bush.

The plants grow tall and strong with vigorous upright canes, branching freely and loaded with pink blooms. The more-than-usual vigor of the plant produces continuous quantities of roses all season.

To produce Portrait, Carl Meyer used Pink Parfait and Pink Peace and considers his hybrid superior to both. In Pink Parfait he had a "mother" with unusual bud form, a range of pink shadings and a floriferous handsome bush. Pink Peace was a vigorous "father" with outstanding fragrance, deep even color and abundant resistant and hardy foliage. Other ancestors of this rose are Charlotte Armstrong, Peace and Crimson Glory.

Selection of a HOME SITE

John Dillavou

In choosing a home site, look for a locality close to the places you commonly go, such as work, shopping, parks, schools and churches. Travel to and from these locations should use as little time as possible. Use a freeway, major or collector street and if possible, public transportation.

Choose an attractive neighborhood, where there are newer or older well kept homes. Manicured lawns are a good sign of community pride. Trees are a definite asset and if you are building or buying an older home it may be worth $1,000–$2,000 extra for a lot with good shade trees. Watch for smoke, soot, dust, business areas, and other possible annoyances. Proper zoning should prevent these intrusions.

You will want the services of electricity, telephone, mail delivery, fire and police protection, street lights, garbage and trash pickup, water and sewer services, and gas. In many areas, especially suburban, not all of these services are available. Obtaining them will mean higher taxes until the area has grown to where many people will be sharing this tax load. Check on streets and sidewalks to see if they are in good repair or need improvement.

Before you invest, check with various lending organizations to see if they will make loans in the area in which you are interested. Be sure to check for any outstanding taxes or special assessments levied against the property. With these factors weighed, you can more easily choose a lot in that neighborhood.

If you are building, or planning the purchase of an older home, the selection of the lot is important. It must be big enough to accommodate your family's needs. Will it accommodate a two car garage, driveway, lawn area and room for outdoor living with its existing style and shape?

A huge lot is not necessary. It can be expensive to buy and costly to maintain if internal arrangement is not properly planned. A 60′ frontage is minimum while 75-90′ would be better. The depth should be a minimum of 100′ deep, 125-135′ of depth is good. An average lot today in a newer Denver subdivision is 80′ by 125′. Lots in southeast Denver presently sell for $8,500. With underground utilities, services to the lot and street improvements, one can cost up to $15,000.

Curving street patterns create attractive lots but rectangular ones may be easier to work with. On long narrow lots it may be best to find a house that is situated the long way on the lot with the end toward the street. Corner lots may be difficult, creating big front yards but leaving little room for play and outdoor living areas. Assessments are usually

higher since you have to pay for two streets and additional sidewalks.

The house should sit at least 12" higher than the elevation at the corner of the lot to provide good drainage away from the house. When water can flow away, the need for drain tile is eliminated and sewage disposal is easier. You can be held responsible for run off onto other property.

Such features as wooded areas, large trees, water, and rock outcroppings, will add interest to your lot. Always have soil tests made before and after construction. This will determine the amount of fertilizer needed for starting lawns and installing plant materials. Good vistas are an asset. Your outdoor living areas, as well as those in your home, should face the south or east since you can obtain more year-round use from them in this way. Northern and western exposures are cooler, and the late afternoon sun a nuisance in summer.

Check into zoning regulations, deed restrictions, marketable title, taxes, and get legal advice. Cost is most important. The cheap lot is not necessarily a good lot — more is required of a home site than a place just to build or buy a house. Every lot will have some disadvantages, but careful planning can overcome undesirable problems that might arise.

COMPOSTING

James R. Feucht

Soil condition is the key to success in every home garden, regardless of whether the garden is used to grow bedding plants, perennial flowers, vegetables, turfgrass or trees and shrubs.

Most soils in Colorado are low in organic matter and many may be too heavy (clayey) or too light (sandy).

Organic matter, such as compost, improves soil tilth by improving aeration and drainage. It also increases the water holding capacity of lighter soils and helps solve the physical and structural problems of both heavy and light soils.

Organic matter helps to improve the availability of mineral nutrients; however, it should be considered more as a soil amendment than as a fertilizer. Most organic materials, such as leaf mold, peat and barnyard manure, are relatively low in actual plant nutrients.

Commercial sources of barnyard manure, peat moss and other organic by-products often are either not readily available or too expensive for the home gardener. Consequently, composting to produce organic matter is a question of economics and convenience.

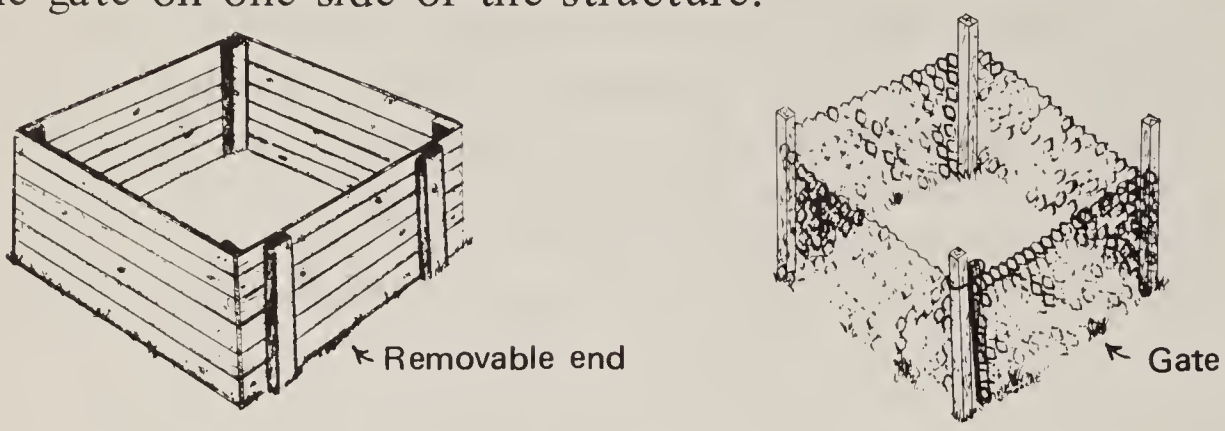
Composting also is a way to utilize and recycle waste material which often is otherwise hauled to the dump.

Building A Compost Pile

There are many ways to build a compost pile. The method selected should depend on the equipment available and the experience of the gardener.

Usually, plant refuse is accumulated in a bin or fenced-off area. One of the most convenient composting structures is a bin made of loosely fitted boards and designed so that one side can be removed.

Another composting structure can be built of chicken wire with a removable gate on one side of the structure.



Two types of compost bins: left, a wooden bin with a removable end; right, a simple enclosure using chicken wire and a gate opening at one end. The height need be only 3 feet, and the length and width are variable, depending on space available.

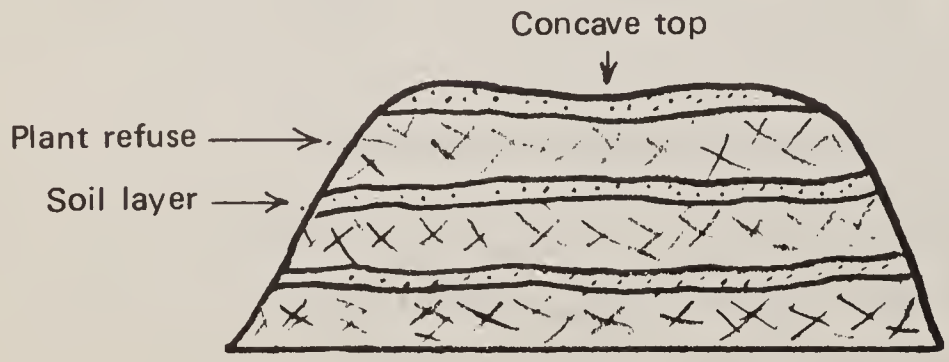
A compost pile can be started at any time of the year. The best time, however, is in the fall when flower beds are being cleaned and the yard raked. If properly done, the compost will be ready for use by the following fall.

Layer Method

The most common method of constructing a compost pile is by alternating layers of plant refuse and garden soil. The soil provides the micro organisms needed for the decay process.

A small amount of commercially available nitrogen should be added to the soil. Add about a half cup of ammonium nitrate to each 10 square feet of surface per soil layer.

Layers of plant refuse should be about 6 inches deep. The soil layers only need to be about 1 inch deep. If the plant refuse is dry, add water to each layer. The last layer (top) should be garden soil and should be slightly lower in the center than on the side to help hold rain water.



Construction of a compost pile by layering. Layers of plant are about 6 inches in depth; soil layer from 1 to 2 inches. Note concave top to trap rain water.

Shredding

To speed up decomposition, leaves, plant stems and other debris should be shredded. This can be done with either a home-type shredding machine or with a rotary mower.

If a rotary mower is used, the shredding should be done on a level spot that is free of sticks, rocks and other foreign material. Shredding with a rotary mower can best be done by two people. One person spreads a thin layer of plant refuse on a level site while the other moves the mower back and forth over the material.

Never put hands near the mower housing. Stay on the opposite side of the mower housing from the side where the grass chute is located.

Turning Compost

A more rapid decomposition and uniform compost mixture will result if the pile is turned every four to six weeks. This is more easily done with a spading fork than with a shovel. Add water if dry spots are noted when the pile is turned.

Types of Refuse

Most vegetative matter – such as tree leaves, green stems of plants, grass clippings and small twigs – makes good compost. Certain types of household garbage also can be put into the pile. Such animal by-products as meat scraps and fat should not be used. These items are a food source and a breeding site for flies. They also will cause the compost pile to have a bad odor.

Weeds of all types can be used in composting. However, since some weed seeds will survive for several years in a compost pile, it is best to include weeds before they have gone to seed or else to cut off seed heads.

Woody twigs more than 1/4 inch in diameter will not readily break down in a compost pile. They also make it difficult to turn the pile and spread the compost. Corn stalks will cause the same problems unless they are broken into small sections.

Grass clippings are excellent refuse for composting. They should not be put in the pile in layers of more than 1 inch thick. Thicker layers of clippings mat and form a barrier to the movement of air and moisture.

Leaves of cottonwood trees tend to mat and turn rubbery if put into the compost pile in thick layers. Shredding of semidry leaves eliminates this problem.

Use

When the compost is ready to use, it is usually a dark brown color. When removed from the pile, it should be lightly sifted with either a spading fork or through a galvanized wire screen of 3/4 inch mesh mounted on a sloping frame. Material that is not well decomposed should be returned to the compost pile.

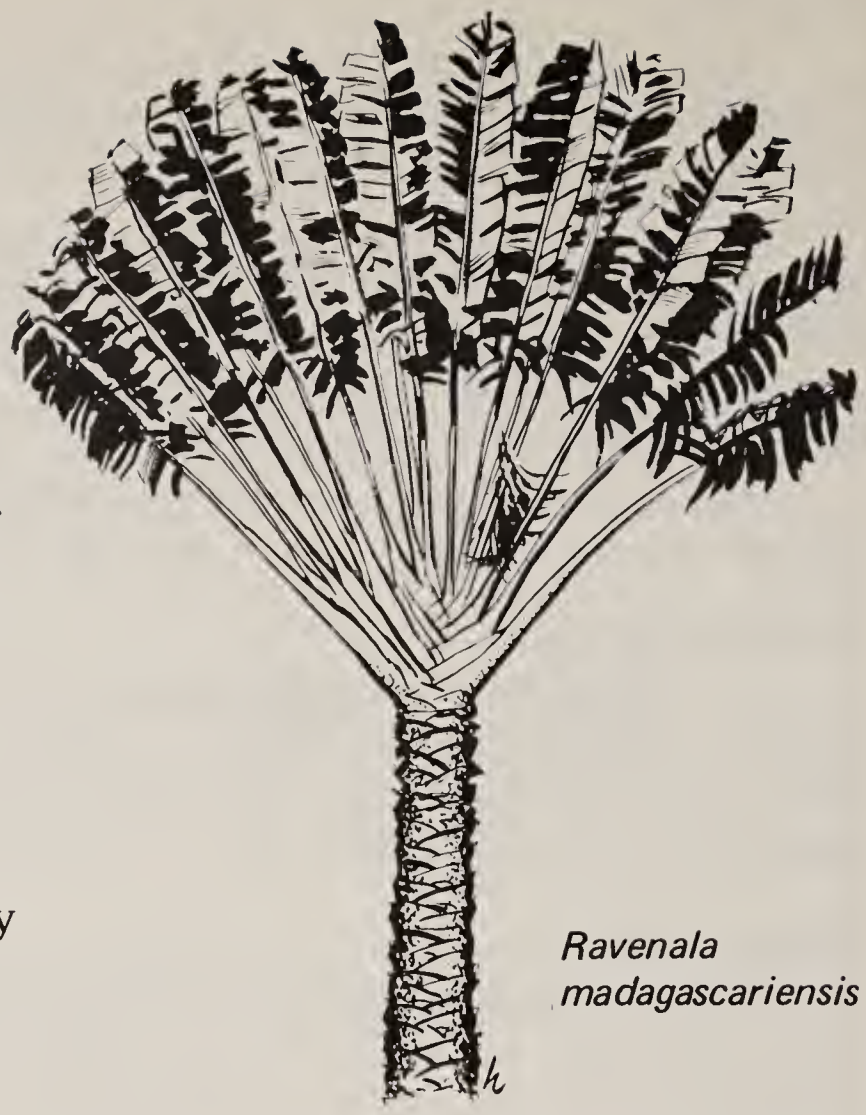
Compost should be spread about 2 inches deep on the garden and spaded into the soil each fall.

Reprint from *Service in Action* leaflet, Colorado State University.

FOCUS on TRAVELERS TREE

in the
Boettcher Memorial Conservatory

Peg Hayward



Ravenala madagascariensis

Ravenala madagascariensis Sonn., travelers tree, frequently called travelers palm, is not a palm but belongs to the banana family, *Musaceae.* The genus *Ravenala* has only two species with an unusual natural distribution, one species native to Madagascar and the other to the Guianas and Brazil. *R. madagascariensis* is the better known.

Ravenala, a Latinized version of the native Madagascan name for the tree, which means "leaf of the forest", may infer the large number of this tree on its native island. The common name of this unique plant is derived from the fact that it is a welcome sight in its native habitat, where water is often very scarce, because the sheaths of the leafstalks store a palatable watery fluid often used to refresh the thirsty traveler. A natural cavity, or cistern, is found at the base of each leafstalk above its union with the stem. Water collected on the broad surface of the leaf flows down a groove on the stalk into this reservoir. At least a quart of water may be stored in each petiole. This great amount of liquid is also important for the plant. The rather shallow root system and the enormous surface of the leaves would otherwise not give enough balance in heavy storms. The leafstalks filled with water make the plant more steadfast.

The stout, palm-like trunk may rise 20 to 30 feet above the ground. At the top of the trunk immense, paddle-shaped leaves grow out in two rows, distichus, on long stalks arranged in one plane like an enormous fan. The concave bases of the over-lapping leaf stems form a basket-like pattern. There may be 20 or more leaves on a single tree, the stalk of each leaf being 6 to 8 feet long and the leaf itself 4 to 6 feet more. Although the leaves do not naturally divide, they are usually more or less shredded by wind action.

White flowers similar to those of its cousin, *Strelitzia nicolai* Regel., white bird of paradise, arise from the leaf axils. They are supported by large boat-shaped bracts about 7 inches long. Seeds borne in hard, wooden pods are covered with a feathery, bright blue substance. The seeds are edible and yield an essential oil.

In Madagascar the *Ravenala* is used in building. Its leaves form the thatch of the houses; the leaf-stems form the partitions and sometimes the sides of the houses; and the hard outside bark, after being flattened, is laid for flooring.

The travelers tree is cultivated for ornamental use because of its picturesque habit of growth. It usually suckers profusely and the suckers may be used for propagation.

FROM OUR FILES

Hobart, Tasmania is a long way from Denver Botanic Gardens. Yet we are officially represented in Hobart. Our "man" is a lady. In addition, she claims only amateur standing for her interest in botany. It is just a hobby. However, reviewing her letters since February 1967, the date our representative moved from Denver to Tasmania, reveals otherwise. We'll let you be the judge after you share in some of her accomplishments.

The following books have been added to the Helen Fowler Library from Hobart: *New Zealand Flowers and Plants in Colour* by J. T. Salmon; *Queensland Flowering Plants, Student Flora of Tasmania* in three volumes by Dr. Winifred Curtis; *Native Orchids of Tasmania* by Firth. Numerous pamphlets and maps which further increase our knowledge of the flora and ecology of 'down-under,' have also been sent along.

Contributions to our plant accessions have not been ignored. The first shipment in 1967 contained the following seed: *Callistemon lanceolatus, Clianthus puniceus albus, Leucospermum bolusii, Arthropodium candidum, Xeronema* spp., *Sophora tetraptera* and bulbs of *Lachenalia pearsoni.*

Subsequent shipments have brought many interesting new seeds for us to try. Currently, our lady is trying to determine how to obtain and ship some native Tasmanian orchids.

As a member of the Hobart Walking Club, she goes on field trips with the Tasmanian Field Naturalists and visits the Winter Gardens in Auckland, the Otari Native Plant Museum at Wellington and the new National Park at Rocky Cape, Tasmania. Each time she encounters new plant challenges to test on port-of-entry officials. Her travels have made new friends for her and for us among nursery companies and botanic gardens.

Do these briefs from her correspondence identify an amateur?

And speaking of identity, our representative may be known by close friends here as the Medical Librarian in the Charles Denison M.D. Memorial Library at the University of Colorado Medical Center. After retirement from the Medical Center, she decided to make a new life for herself. She chose Tasmania. She now is on the staff of the Faculty of Medicine, University of Tasmania. Her next vacation to the United States and Denver is scheduled for 1973.

We know she would enjoy hearing from her friends and members of the Denver Botanic Gardens. Her address is: P.O. Box 497 E, G.P.O., Hobart, Tasmania, Australia 7001.

Her name? Miss Esther Holt.



Emma Armstrong Ervin

Katharine Bruderlin Crisp

Many of *The Green Thumb* readers have inquired about Emma Ervin, the artist whose sketches of Colorado wild flowers have often appeared on the cover or as illustrations in the magazine.

Emma Armstrong Ervin (1874-1957) was born in Georgetown, Ohio and educated in the schools there and later in Cincinnati Art Academy. She came to Colorado in 1895 and was married to Frank Ervin in 1896. Later they became interested in a cabin site in Estes Park on land owned by Enos Mills. Mr. Mills deeded land south of Longs Peak to them. A staunch friendship developed between the Mills and the Ervins. Enos Mills, a well known naturalist, would bring specimens for Emma to paint. She, herself, was unable to do the strenuous climbing required to collect the plants.

The Ervins spent many weeks during each summer at their cabin and never failed to take a friend or two along to enjoy the beauty of the region.

Mrs. Ervin and her husband were for several years active members of the Colorado Mountain Club and were interested in the preservation of wild flowers. Emma was chairman of the Nature Protection Committee in 1917. She illustrated various articles for the magazine *Trail and Timberline.* The themes expressed in these drawings are evidence of her interest in wild flowers and animal life.

About 1914, Mrs. Ervin began her water colors of Colorado wild flowers. During the next 20 years, the collection grew to more than 175 paintings. The drawings of flowers fresh from the field, are life size and accurately drawn and colored. The painstaking detail is most impressive. It was her ambition to prepare an illustrated flora of the wild flowers of Colorado; however, the printing of colored illustrations was an expensive process and a publisher could not be found at that time.

In 1935, Mr. Ervin died and her failing health forced her to give up her beloved cabin in Estes Park. She settled in Denver and continued her artistic efforts until her death in 1957.

A few years before her death, the collection of water colors was brought to the attention of the Colorado Forestry and Horticulture Association by Mrs. Henry F. Brooks. Through the generosity of Mrs. John Evans, it was purchased for the Association. The five volumes entitled *Colorado Wild Flowers* were prepared by several persons who devoted much time, money and energy to the project. Mrs. Alexander L. Barbour donated the album covers and the plastic sleeves; Mrs. Marjorie Shepherd acted as general supervisor. The work was done by Mrs. Jackson C. Thode, ably assisted by Mrs. Russell Cookson and all the members of the Morning Belles Garden Club. Dr. William A. Weber, Professor of Natural History, Curator of the Herbarium, University of Colorado, helped in completing the names on the specimens.

More information on the life of Emma Ervin is available in the Helen Fowler Library as are the water colors themselves. Certainly, the readers who have not had the opportunity to study and examine the originals will find a visit well worth their time.



Ximenesia encelioides Goldweed



Trees in the Desert

Lee Chambers

What's all this fuss about caring for your trees in winter? "Everyone" knows that all trees are dead in the winter. "Everyone" knows that the sap comes up in the spring and brings them to life again. Well . . . maybe not "everyone." I don't know it. In fact, trees are very much alive in the winter and very beautiful too if properly cared for.

Okay, so trees don't die in the winter. So what? So their first need is water throughout the winter season. The sap doesn't "rise" in the spring. It's there all of the time, or that part of the tree where there is no sap dries out and dies. The result is called "die-back" or "winter-kill." Often the upper parts of a tree will not leaf out in spring because of a warm, dry winter. Think back! How often in December, January, or February have you been able to play golf, dig in the garden, or take part in some other outdoor activity in your shirt sleeves?

So the answer to winter-kill or die-back is simply to provide water. How? I recommend a general soaking of the root area around the tree – not just around the trunk, but all the way out past the drip line. If one has the usual trees and shrubbery, the best thing is to "water" the whole yard and garden. It surely won't hurt the lawn, and it will help the woody plants to stay healthy. How often? Well, the best answer is, "whenever it needs it." Hmmm, not much help, is it? Okay, about once a month would be a good rule of thumb. Like most rules of thumb, this one needs to be tempered with reason. Of course, if it rains or snows a lot, you don't need to add water. But! Watch those chinook winds! These are the winds that come down off the mountains. Dry from losing their moisture on the upwind side of the hills, and warmed by compression coming down this side, they can evaporate several inches of snow and leave the ground as dry and dusty as it was just before it snowed. And, what is worse, they also suck the moisture from trees and shrubs, especially the evergreens. So, if the winds are westerly, you will need to water more often than if they are easterly. One needs only to look at or to feel the ground to determine if it is dry or not.

Let's face facts. We live in a desert – less than 14 inches of annual

rainfall! Most of it falls from March through July. In order to see what our area would look like if left to Mother Nature, one needs only to take a drive a few miles in any direction to find an unfarmed area – short grasses, yucca and cacti, no trees except a few cottonwoods and box elders along usually dry stream beds. All of our trees, shrubs, and evergreens are "exotic plants" unable to survive naturally in Denver. Evergreens – including the beautiful blue spruce, concolor fir, Douglas fir, junipers from large upright scopulorums through pfitzers, tammys, and down to low-creeping andoras – all are more or less active during the warmer, winter days, so they are extremely sensitive to winter dryness.

Winter is also the best time to inspect one's trees and shrubs. At this time the absence of foliage enables one to spot troubles of many kinds – overly long branches that will bend or break from their own weight, snow, or wind; diseased areas that need to be removed; dead branches; and, perhaps the most insidious of all problems, anything (string, wire, rope) that is tight around a branch or trunk. (Many times I have had to explain that the reason the whole top of a tree, planted only a few years ago, broke off was because the soft, copper wire that held on the name tag had not been removed.)

Also some insect problems are more easily seen when the leaves are absent. Scale is one of these – oystershell scale, elm scale, cottony-maple scale are just a few of them. Boring insects can be noticed by the "saw dust" they produce, or by irregularities in the surface of the bark.

One of the best measures to control scale is the application of a dormant-oil spray. Since this is applied during the dormant or leafless period, and since it must be applied at temperatures above 40°F., it is important that your order be placed early in the fall to give the commercial sprayer ample leeway in scheduling the work. We usually have plenty of days that are suitable for dormant spraying, but their occurrence is a bit unpredictable. As for the control of borers, there are several methods to use, but most are summertime treatments.

Wintertime is the best time for most pruning. An experienced operator has no trouble distinguishing dead and live wood. Even you can do it with your eyes closed. Take a twig or small branch that you *know* is dead and a similar one that you *know* is alive, and feel the difference. It's obvious which is which even by touch alone. Also with the leaves gone one can study the structural components of a tree and pick and choose those branches to remove that will result in a well-shaped and structurally sound tree.

A tree is a thing of beauty, or it should be. A tree should not be pruned in such a way that it is obvious it has been pruned. It should look as though it had just grown that way. The stubbed-off branches and dense, compact, even outline usually denote a job done by a "handyman", not a tree surgeon. Take a good look at some trees in the winter. It's not hard to find a graceful, well-shaped tree, nor is it difficult to spot trees with all of the grace and beauty of a worn-out whisk broom. Which would you rather have in your yard?

There are few, if any, hard and fast rules when one deals with living things. What may be the accepted practice in New England may not work in Denver at all. To grow fruit in an orchard is one thing, but quite something else in one's back yard. What's right when pruning a tree on a city boulevard may not be too good for the specimen tree in front of your home.

Some of the most frequent questions and my answers are: When is the best time to plant, and why? – Probably the best time to install woody plants is in the middle of spring, because the plant will suffer less transplanting shock at this time. I do not recommend fall planting for the same reasons mentioned above about watering. A tree or shrub that has had most of its root structure removed, as in transplanting, obviously has lessened ability to replace water lost through normal respiration. It, therefore, is more apt to dry out and die through several months of winter than it would during the spring and summer when more water is available to it.

What about wrapping tree trunks? – Most young, transplantable trees would benefit by having their trunks (and maybe even the main branches) wrapped during the dormant season. The purpose of wrapping is twofold: It cuts down on moisture loss by creating a microclimate near the trunk by cutting down on the flow of air around the tree's surface. Secondly, it also provides protection from the low winter sun and, therefore, ameliorates the up and down temperature of the bark. This helps to lessen the dying of the cambium under the overheated bark – often referred to as sunscald. Yet another possible benefit is a deterrent to many insects that attack the lower parts of woody plants.

When should you prune flowering shrubs? – If the flower buds are cut off, of course they can't bloom, so the time to prune is before those desirable buds form. They form during the growing season after the plant has blossomed. Therefore, the time to prune flowering shrubs is just after they have flowered. The plant proper will not be harmed by pruning at any time, but the flowers for the next blooming may suffer.

How much should one prune? – That's a hard one. I'll fall back on a rule of thumb – about 1/3 of the leaf-bearing surface. Some trees thrive even when pollarded, but I think they are hideous. By taking only a third, one can control the size and still maintain a natural appearance.

So, winter IS the time to care for your trees. Water thoroughly when they need it. Look them over for any problems that have developed. And prune them to enhance their appearance and health.

For Your Information

Some of our readers might be interested in the *Arizona Highways* issue of August 1971. The whole magazine is devoted to wild flowers, many of which are also common to Colorado. The photography, as always, is excellent and the plants are described in a most interesting manner.

INTERNATIONAL ROCK GARDEN PLANT CONFERENCE

Marion I. Alexander

The Fourth International Rock Garden Plant Conference was held at Harrogate, in Yorkshire, England, this past April. Some Coloradoans may be interested in a brief account of the meetings as rock gardening is a "natural" for this state – though there are only some half dozen members of the American Rock Garden Society in Colorado.

Garden tours for five days before and three days after the Harrogate meetings were arranged primarily for overseas visitors. There were so many registrations for these that two buses, with thirty in each, were necessary. More than a half dozen countries were represented on our bus, with some visitors from as far away as New Zealand and Australia. Among those on our bus were Albert Sutton, editor of the *American Rock Garden Society Bulletin,* and his wife.

Our guides for these tours were distinguished British rock gardeners – J. K. Hulme, Director of the Ness Gardens of the University of Liverpool for the first five days, and for the last three days, Mrs. L. C. Boyd-Harvey, Secretary of the Scottish Rock Garden Club.

We visited many large public and estate gardens in England and Scotland, as well as several smaller private gardens. Outstanding were the Savill Garden in Windsor Great Park, with its fields of small, hoop petticoat narcissi, and the Ness Gardens, with its great expanses of heather beds and rhododendrons. The great rock gardens at Wisley, of the Royal Horticultural Society, and at the Royal Botanic Garden, Edinburgh, were overwhelming. Each garden, private or public, had much to offer. The English and Scottish are great gardeners, though they must admit that they do have a very favorable climate for gardening.

About four hundred people were at Harrogate for the Conference meetings from April 21 through April 25. Enthusiastic gardeners with



Trough beds of alpines, Wisley

Garden – Belford, Northumberland



first-hand experience in the field discussed and showed pictures of their favorite rock garden plants, often alpines, from Switzerland, Spain, the Himalayas, New Zealand, America, and elsewhere. Specialists presented techniques of rock garden construction, information about new plants (both new introductions and new horticultural varieties), and special instructions for handling different groups.

For me it was exciting to see and hear persons whose names had previously meant to me only authors of books or articles on rock gardening. Such persons were A. Correvon, grandson of the author of my oldest book on rock garden plants; E. B. Anderson, whose Penguin Handbook *Rock Gardens* in my library is now well worn; Will Ingwersen; R. C. Elliott, editor of the *Bulletin of the Alpine Garden Society;* Anna Griffiths; Lincoln Foster; and many others.

The meetings coincided with the Harrogate Great Spring Flower Show, and there we saw what the British mean about growing rock garden plants in pots. This show was a real treat for a gardener dealing with many unknowns.

At the meetings we gathered many new ideas, met many friendly people with common interests, and came home determined to do a better job in our rock garden and learn more about Rocky Mountain alpines and how they may be introduced into cultivation.

CLAY *VS.* PLASTIC POTS

Many readers have asked which are better: clay or plastic pots? Both are used by amateurs and professional growers alike but generally clay is prefered. Some of the advantages of both are as follows: Clay pots are heavier, thus are less inclined to tip over. Less chance for over-watering (root suffocation) with clay pots because of water absorption through the sides. Clay also keeps roots cooler than plastic since the walls are porous.

Plastic pots require less frequent watering since soil does not dry out as quickly as in clay pots. However, home gardeners and amateur greenhouse owners must learn to water plastic pots carefully since roots may suffocate from over-watering. This happens often not only with plastic but also with glazed or metal containers. Plastic is lighter and cheaper and seldom breaks, although it will crack.

Tests show that soil temperature in a plastic pot is higher than in a clay pot. A thermometer inserted into the soil ball (halfway) in a plastic pot showed a reading of 101°F., whereas the soil temperature in a clay pot was only 90°F. Just what effect this higher temperature has is not understood but work with some ornamentals has indicated that soil temperatures above 90°F, might adversely affect plant growth.

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SHADY GARDENS

Evelyn F. Johnson

People who have large trees and shrubs often think that they cannot have a pleasing flower garden. It is true that many of the brightest, most colorful flowers such as roses, poppies and many other perennials require sunlight most of the day. Too, most, if not all of the annuals, such as marigolds and petunias do best in sunny areas.

But you may be surprised to find that you are able to grow a lovely and satisfying garden in considerable shade and that it can have plants blooming from earliest spring until autumn.

The shady garden has its advantages. Such a garden presents many varying pictures of light and color all day long because of the constantly changing patches of sunlight and shadow cast by the trees. This may be more interesting and restful than the more spectacular display of sun-loving flowers that require incessant light much of the day.

There is a surprising number of plants that do well in more or less shade. No plants will do well in densely shaded areas never reached by the sun; but there are few such places, even under big trees.

The soil of the shady bed requires extra attention and should have compost or peat moss and if possible, well rotted manure added to it. Clay soils should be lightened with sand as the soil should be loose.

Roots of small trees can be restrained by the use of metal strips sunk into the ground and the bed can be built up with an extra amount of humus. Lower branches of big trees can sometimes be trimmed to let in more sun and air. Big roots that push up to the surface can often be safely covered over with even as much as a foot of soil.

Some shade-loving plants require more acidity – often difficult to provide and maintain in our alkaline soils. In addition to adding peat moss and compost, the beds should be dusted with iron sulfate or agricultural sulfur. Sulfate of ammonia is especially good for this purpose. Plants already growing may be sprayed with a solution of sulfuric or phosphoric acid; this will not harm them.

In early February, "the darkest and saddest time of the year," I can sometimes pick flowers for an arrangement from one of my shady beds. These are the lovely white Christmas roses (*Helleborus niger*) which sometimes, but only rarely, open in time for Christmas. They are followed a little later by the purple Lenten roses (*H. orientalis*). If you are inter-

ested in making a collection of green flowers, you may want to plant *H. foetidies*, an interesting plant which attracts much attention. Often, too, as the white and purple hellebores age, they turn a pale green.

A nice thing about the hellebores is that they are evergreen and do not disappear after flowering as so many early bloomers do. They remain in attractive green clumps all summer long until they begin to set buds again in October and November.

Another evergreen to plant as a ground cover among the hellebores, is quite familiar to most gardeners. *Vinca minor* which was called "joy-of-the-ground" in days of long ago, is now called periwinkle or myrtle. *Vinca*, 'Bowles Variety' has the deepest blue flowers. Another vinca, *V. major*, has larger leaves and its variegated form helps to lighten a dark corner.

The golden buttercups of winter aconite (*Eranthis*) brighten the bed of Christmas roses. These may be accompanied by the blossoms of many of the species bulbs such as the winter-flowering crocuses, snowdrops, scillas, and chionodoxas. All of these build sizeable colonies if left undisturbed over the years.

Sweet woodruff (*Asperula odorata*) is a nice subdued ground cover under trees and bushes and among bulbs. It has dark green foliage and small white flowers. These have a pleasant odor if touched or cut and dried.



Lysimachia nummularia, another ground cover, must have great popularity judging by all the pet names it has been given: creeping-Jenny, creeping-Charlie, money-wort, yellow myrtle, loosestrife, wandering sailor, and down-the-hill-of-life, to name a few. By midsummer, it has shining round leaves and bright yellow buttercups. If it has plenty of moisture, it will grow under trees where grass will not. It is quite a traveler and may be considered a pest but is too attractive and useful to do without in the shady garden.

Another plant in this class is *Aegopodium,* bishops weed or snow-on-the-mountain. Its green and white leaves make an attractive border. Another nickname, garden plague, warns that it may have to be restrained.

The Virginia blue bells *(Mertensia virginica)* are a joy to lovers of blue flowers. This plant grows into clumps that are loaded with blue bells. It is another early bloomer that disappears during the summer so

remember to mark the spot!

There are two spring anemones that should be in everyone's garden as they do so well here in Colorado. The pasque flower (*Anemone pulsatilla*) is called Easter flower because at that season our hillsides may be covered with its silky blossoms. These are followed by fluffy seed pods that are very attractive. This, or a closely related variety, is the state flower of South Dakota.

The snowdrop anemone (*Anemone sylvestris*) has pure white fragrant flowers in the garden in May. This is a long-lived perennial that spreads from seed in a shady spot.

There are two anchusas that do well in light shade. One is *Anchusa myosotidiflora* (also listed as *Brunnera macrophylla*). This blooms in April and May with tiny star-like blue flowers accounting for the common name, Siberian forget-me-not. It grows in foot high clumps with large heart shaped leaves and is long-lived and reproduces from seed. The plant may also be divided.

A new variety of anchusa 'Dropmore' has recently come from England. It is called Loddon Royalist and makes a shapely plant 2 or 3 feet tall. It bears a multitude of brilliant purple-blue flowers over a long period and reseeds with no trouble. The foliage of both the anchusas is large and coarse but that can be forgiven since their flowers give some of the best blues known in the garden.

The bleeding hearts need at least partial shade and a rich mellow soil with plenty of moisture. The dwarf *Dicentra eximia* grows about a foot tall and bears pink flowers for most of the summer. *Dicentra spectabilis,* a taller plant, blooms in May and June and usually disappears in late summer. The sprays of deep pink or red hearts are very beautiful.

Primroses with dwarf campanulas and hardy geraniums are good companions in a partly shaded bed. Again, the soil should be light and loose and enriched with peat moss or compost. New varieties of the polyanthus primroses are available in many rich colors: orange, bronze, bright crimson and flame shades. There is a gold laced variety which is dark red and edged with gold. The true blue acaulis primrose called 'Blue Beauties' is most outstanding. A packet of this seed will give many shades of blue from sky-blue to deep blue.

Some of the dwarf campanulas provide beautiful blue or pure white colors after the primroses are finished. These low growing campanulas such as *C. carpatica, C. muralis* and *C. garganica* are all easy to grow and make shapely, long blooming mats.

Euphorbia polychroma or *epithymoides,* as it is sometimes called, is a distant relative of the poinsettia of Christmas time. Like the poinsettia, the true blossoms are small and hidden in highly colored leaves which are often mistaken for the flowers. In this hardy garden variety, however, the colored leaves are not red but a brilliant chartreuse yellow. It remains attractive for a long time with brown seed pods appearing in the center. The foliage of the whole plant turns dark red in the fall.

The *Hostas* (plantain lilies) need partial shade. The large ornamental

foliage makes a wonderful edging for driveways and foundation plantings. The flowers on tall stems, may be blue or white depending on the variety. Some are very fragrant. *Hosta glauca* or *sieboldiana* has blue-green leaves and white flowers while the foliage of 'Honeybells' is yellow-green and the flowers are lavender. 'Honeybells' is especially fragrant. 'Thomas Hogg' makes a 2 foot compact plant with silver and green variegated leaves and dark blue blossoms.

The *Thalictrums* or meadow rue are tall background plants, providing contrast with their ferny leaves; *T. glaucum* has fluffy yellow blossoms and the variety *T. rochebrunianum* is lilac in color.

Most of the veronicas tolerate shade. The low-growing *V. rupestris* is a favorite because of its brilliant blue flowers and neat spreading habit. The variety *V. incana* with silvery foliage, sends up 12 inch spikes of lavender flowers, while *V. spicata*, another low clump, is blue. Taller veronicas are *V. amethystina,* 'Royal Blue' and 'Icicle' with white blossoms. An interesting veronica that I have only recently acquired is *V. gentianoides.* The plants grow in low mats with shining green leaves. In early summer, they bear 12-inch spikes of dainty bells of a most unusual pale blue color – "the color of skimmed milk" according to Louise Beebe Wilder. This plant likes light shade and leafy soil. The mats spread but do not become a nuisance.

The biennial foxgloves (*Digitalis*) do well only in shady spots where they reseed themselves generously. The tall purple blossoms are most welcome in the summer. The yellow foxglove *D. ambigua* seems to be truly perennial and long-lived in the shade of trees.



The Rocky Mountain columbine must have somewhat acid soil and light shade to keep its true blue color. The hybrid variety called 'Mrs. Nichols' seems to maintain the color better than the species in our altitude.

A few useful herbs that will grow in a shady corner are lemon balm, chives and all of the mints. Parsley makes an excellent border for such a bed.

There are many other plants suitable for use in shady gardens. Some demand shade such as ferns, lily-of-the valley and most of the lilies. Many others will grow and make a good showing in either sun or shade.

With such a wide field to choose from, no one need despair of having an attractive garden even in the shade.

BOOK REVIEW

Adrosko, Rita J. *Natural Dyes and Dyeing.*
New York, Dover, 1971. $2.00

During the revolutionary period and later years, because of wars, lack of manufacturers' standardization and funds, many people were involved in home dyeing using the available natural dyestuffs. Their results were more or less good depending on practice, expertise and materials used but there was one general complaint – the lack of consistency in colors produced. Home dyeing has enjoyed a renewed popularity for this very reason – the search for individuality. What was the bane of yesteryear is the boon of the present. The fact that one batch of dye will rarely be exactly like the next or like the one done by a neighbor appeals to the strong individualistic streak common in all strata of today's society as well as to the do-it-yourself enthusiast.

This book will help. It is well organized. Part One gives the historical background on each color and Part Two is a revised guide to home dyeing with natural dyes. This section begins with the scientific explanation of coloration, color viewing, mixing and variation in home dyed textiles, the limitation of color range with natural dyes and the dyeing of fibers, yarns and pieces of cloth.

This is followed by the how-to section: equipment required, procedures to follow and tested dye recipes. Although all the required materials are not naturally available in our area, many are, such as sunflowers (gold color), zinnias (light yellow or greenish yellow, depending on mordant used), dahlias (orange), apple bark (dark yellow-tan), marigold flowers (brass color). Kinds of materials which can be used, the making of mordants, exact quantities and timing are all clearly given in a recipe book manner followed by the method.

In order to obtain a specific hue, top dyeing is sometimes necessary. This involves the use of two dye baths. A chart explaining the matter to be dyed (wool or cotton) lists the mordant, the first dye and directions to be followed, and the second dye with the methods for its use.

The text completed, there follows a general bibliography, a list of dye manuals printed in America before 1870, excerpts from early 19th century writings giving methods, sources of dyes and recipes for obtaining specific colors.

Whether or not you are particularly interested in trying this yourself, the book is worth examining and reading. It is also not too late to collect some of the ingredients. Since this book is lucidly written, the recipes use current weights and measures, and the methods are clearly explained giving exact timing, this manual could be used in school projects or individual scout badge earning endeavors or just for the fun of trying it.

Natural Dyes and Dyeing is available in the gift shop and in circulation in the Helen Fowler Library of the Denver Botanic Gardens. *S.H.*

Medium-sized Shrubs for Dry Land Gardens

A. C. Hildreth

This is the fourth of a series of articles on gardening under dry land conditions on the central Great Plains. The three previous articles of this series published in *The Green Thumb* were: Dry Land Gardening on the Plains, autumn 1969, Selection and Care of Dry Land Trees, summer 1970, and Tall Shrubs for Dry Land Gardens, spring 1971.

The article on tall shrubs (spring 1971) emphasized that there are plenty of shrubs which are both cold-tolerant and drought-tolerant. They come in different sizes – tall, medium-sized and low. The group of medium-sized shrubs contains the most species.

The same article also arbitrarily set the minimum height of tall shrubs at over 6 feet. This automatically established the maximum height of middle-sized shrubs at 6 feet. For the purposes of this discussion, the minimum height of the medium-sized group is arbitrarily set at 3 feet. Thus, medium-sized shrubs are considered as ranging in height from 3 to 6 feet.

Shrubs on dry land grow slowly and never reach the height attained by the same species or cultivars when grown under irrigation or in more humid climates. For this reason many shrubs classified in horticultural literature as "tall" are regarded by dry land gardeners as "medium-sized" and must be treated as such in dry land plantings.

There is a good deal of difference between mere survival and growing into an acceptable garden subject. From among the many middle-sized shrubs that endure dry land conditions on the central Great Plains, a dozen have been selected for special consideration. These are not only well adapted to plains soil and climate but they are especially suitable for use in landscaping dry land gardens.

Amorpha fruticosa angustifolia Pursh. var. False Indigo or Indigo Bush. This native of the western plains is a summer bloomer. The small flowers are violet-purple, borne on spikes clustered at the ends of the branches. When the bushes grow scraggly from old age or neglect, they should be cut back to the ground and allowed to develop new tops. This shrub is resistant to attacks by grasshoppers.

Caragana microphylla Lam. Littleleaf Pea Tree. This native of Siberia and north China is similar in general appearance to the familiar tall *Caragana arborescens* Lam., but the *C. microphylla* bush is smaller, and neater and has larger flowers. This is a good shrub for border plantings and for hedges, either clipped or informal.

Caragana microphylla 'Tidy' is a cultivar of *C. microphylla,* developed in Canada. This cultivar has long, narrow leaflets which give the shrub a feathery appearance. It is excellent as a specimen shrub.

Cercocarpus montanus Raf. Mountain Mahogany. A native of the Rocky Mountains and of steep rocky places on the western plains. The leaves are dark green on the upper surface, and lighter green and some-

what woolly underneath. The flowers are not showy, but the twisted "fuzzy tails" attached to the seeds are interesting in late summer and early fall. This is a good shrub for border plantings and for hedges, either sheared or informal.

Cotoneaster acutifolia Truez. Peking Cotoneaster. A native of China. The glossy green leaves take on a deep red color in autumn. The black berries hang on the branches all winter. This shrub is suitable for border plantings. It is much used for sheared hedges in climates too cold for privets.

Cotoneaster integerrima Med. European Cotoneaster. This is perhaps the hardiest of the cotoneasters. The foliage is bluish-green. The flowers are not showy, but the abundant small red berries in late summer and fall make these shrubs attractive as specimens, in informal hedges and in borders.

Perovskia atriplicifolia Benth. Russian Sage. An interesting member of the mint family, native in central Asia. The foliage is silvery gray and powder-blue flowers are borne in long airy panicles at the ends of the branches. The flowers are easily dried for use in dry arrangements. These shrubs are among the latest to bloom in the fall. The leaves, either fresh or dried are good for flavoring soups and stews. This is a potent condiment and cooks should be careful not to over-season foods with it.

Prunus tomentosa Thunb. Nanking or Manchu Cherry. A compact bush with densely hairy leaves. It blooms very early in spring and the flowers, either pink or white, usually open before the leaves. The fruits, either red or yellow, ripen very early and are quite edible. They are good for pies, preserves and jams.

Ptelea baldwinii Torr. Hop Tree or Wafer Ash. This is a very drought resistant shrub native from Colorado southward into Mexico. The leaves are dark green in color and in shape resemble those of our common green ash. The creamy white flowers are borne in drooping clusters. The fruits are light brown colored discs similar to those of Siberian elm. They hang on the bush all summer.

Ribes leptanthum Gray. Trumpet Gooseberry. This is a little-known shrub of the Rocky Mountains from Montana to New Mexico and Arizona. The dark green leaves appear very early in spring. Neither the whitish trumpet-shaped flowers nor the blackish fruits are conspicuous. The sharp spines on the branches make this an excellent shrub for barrier plantings.

Rosa rubrifolia Vill. Redleaf Rose. This hardy shrub from the mountains of Europe is grown chiefly for its red foliage. The flowers are red, small and single and the blossoming season is short. The fruits are abundant and attractive. They are bright red and hang on the shrub all winter, making a cheery spot of color in the winter landscape.

Tamarix hispida Willd. Kashgar Tamarisk. A handsome shrub from Asia with feathery blue-green foliage. The small pink flowers are borne in plumy clusters on the ends of the branches during late summer and early autumn.

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The Green Thumb

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

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THE COVER

Begonia Angel wing
Photo from files of Denver Botanic Gardens

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The Green Thumb

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MARGARET SIKES, *Editor*
WINTER 1972

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BEGONIAS FOR THE INDOOR GARDEN

Helen Marsh Zeiner

Begonias offer infinite variety to the indoor gardener, for there are about 1,200 species plus an endless number of hybrids and horticultural varieties.

Some begonias are grown primarily for their flowers, others for their foliage. All begonias will bloom if conditions are right. A begonia in bloom is always of interest because there are two distinct kinds of flowers to be found on the same plant. The female flowers have interesting "corkscrew" stigmas, while the male flowers have clusters of pollen-producing stamens. Some begonias are among the easiest to grow of all house plants; others are difficult enough to be challenging.

Credit for the discovery of the begonia goes to Charles Plumier, a Franciscan monk and a botanist. While on a botanical expedition to the West Indies about 1690, Plumier found six species of a new plant growing in Santa Domingo and sent herbarium specimens to Europe. The botanist Tournefort, in 1700, named the genus *Begonia* in honor of Michel Begon, a French botanist who was governor of Santa Domingo and who had helped Plumier in his search for new plants.

The genus *Begonia* is the largest and most important genus in the family *Begoniaceae*. Begonias are native to Mexico, Central and South America, Asia and South Africa. They are found in greatest numbers and luxuriance in the damp shady forests of Brazil and the Andes, and are also very numerous in the Himalayan rain forests and the Malay Archipelago.

Although the naming of the genus in 1700 officially marked the discovery of the genus *Begonia*, other early explorers in Mexico and Jamaica found plants that were probably begonias, but they were not named or brought back for cultivation. For example, *Rerum Mediacorum Novae Hispanae Thesaurus,* a work by Father Hernandes published in 1649, pictures a Mexican plant which is undoubtedly a begonia.

The first living begonia is said to have been introduced into England in 1777. It was *Begonia nitida* Dry., discovered in Jamaica by Dr. William Brown.

Interest in this new genus developed rapidly, and by 1850 more than 300 species had been described. Many of these were herbarium specimens rather than living plants. Nevertheless, growers were hybridizing begonias as early as 1840.

In such a large group of plants you would expect to find great diversity, and it is difficult to set forth general rules for the care of begonias because there are so many different kinds with different

requirements. However, there are a few very general rules which are applicable to the group as a whole.

Keep in mind that begonias are mostly tropical in origin and like humid, warm growing conditions. The soil should be porous with good drainage, and should contain a fairly high percentage of peat or leaf mold. For most begonias, filtered or diffuse sun will be satisfactory. The wax begonias will tolerate the most sun, the rex begonias the least. Most begonias grown as house plants are fibrous rooted and should be kept evenly moist but not water soaked. The fine fibrous roots can be damaged quickly by either too much or too little water.

The botanist divides begonias into two groups: the fibrous rooted begonias, to which most of our house plants belong; and the tuberous rooted, to which the beautiful summer-blooming begonias of the shady garden belong.

Some horticulturists divide begonias further, classing together as rhizomatous begonias those with thick, root-like rhizomes which root when they come in contact with the soil. The rex begonias, complex hybrids with beautiful leaves, are also recognized as a separate group by some horticulturists.

Among the begonias popular for the beauty of their bloom would be the well known and deservedly popular wax begonia; its double form, the rose begonia; the calla lilly begonia, a variegated form of wax begonia with upper leaves which resemble small calla lilies; and the beautiful Christmas begonias.

Among the begonias prized for their foliage are the rex begonias, beefsteak begonias, ricinifolia begonias, angel wing begonias, and the beautiful and comparatively new iron cross begonia.

Some begonias grown primarily for their foliage will bloom readily. The angel wing begonias and the ricinifolias are examples of begonias prized for both flowers and foliage.

Begonias vary greatly in size. The wax begonias, for example, are basically small and can easily be kept to a size suitable for a window sill. Others, such as ricinifolia, become very large and are suitable only for large rooms.

Discussion of a few of the many known begonia varieties and specific instruction for their care follows:

WAX BEGONIAS

Wax begonia, *Begonia semperflorens* Link & Otto, is one of the easiest to grow and most satisfactory of all house plants. It is an excellent choice for the beginning indoor gardener. A well-grown begonia will bloom almost constantly, and the plants will begin to bloom while they are very young.



WAX BEGONIA

Many varieties of *Begonia semperflorens* are available. Flowers may be white or various shades of pink or red. Although each flower is small, the blooms are showy because several flowers are borne in a cluster.

Wax begonias are named for their waxy leaves. In most varieties the slightly fleshy, oval leaves are a bright, shiny green. In others the leaves are reddish brown or bronze in color.

The succulent stems tend to branch freely, forming bushy plants. A well-shaped plant can be maintained with a minimum of pruning.

Some sun is necessary to produce blooms and good leaf color. On the other hand, too much sun will bleach the leaves until they are almost colorless. If this happens, move the plant to a more suitable location or put a sheer glass curtain between the plant and the window glass.

Too much heat through a window may actually burn tender leaves. Again, the solution is to move the plant farther from the window or protect it with a glass curtain.

Wax begonias are not fussy as to soil – any standard potting mix will do. Good drainage in the pot is a necessity.

When watering a wax begonia, soak it thoroughly and then let it dry out before watering again. Never let the plant become dry enough to wilt. An application of very dilute plant food about once a month will keep the wax begonia in good condition. Do not overfeed.

Wax begonias can be readily propagated by cuttings. Take cuttings of good, strong growth at the base of the plant. Root in moist sand or vermiculite, or if you prefer, in water. If you use the water method, be sure to pot the cutting when the roots are about an inch long.

Wax begonias are often used for bedding plants in the summer. Cuttings may be taken from these plants late in the summer to provide young house plants for winter use. Small bedding begonias may be dug and potted for indoor use. The top must be cut back heavily to make up for root damage incurred in digging the plant.

A double variety of wax begonia known as rose begonia or rosebud begonia is a lovely flowering house plant. The very double flowers really do resemble miniature roses. Rose begonias are not quite as easy to grow as the standard wax begonia. They prefer cool temperatures. If the room is too warm, they simply will not succeed.

The calla lily begonia is a novel variety of wax begonia. It is called calla lily begonia because the youngest leaves at the ends of shoots are white and somewhat rolled so that they look a little like the flower of a calla lily. Because no food is made in the white parts of leaves, these plants are less sturdy than those with all green leaves. Be sure, when making cuttings, to have more green leaves than white on the cutting. Otherwise, the cutting may not root satisfactorily. Too much heat is the worst enemy of the calla lily begonia, with too much water a close second.

REX BEGONIAS

Rex begonias are considered by many to be the most beautiful of all begonias; they are also considered to be the most difficult of all begonias to grow successfully.

Rex begonias are grown for their beautiful leaves which are often

brightly colored with interesting textures, shapes and markings. They are hybrids developed from the original *Begonia rex* Putz. or king's begonia, discovered in Assam, India in 1856. The original plant was sent from Assam to Belgium, where hybridizing began.

The authoritative house plant book *Exotica* pictures and describes approximately 100 varieties of rex begonias, each one prized for its beautiful – and different – foliage.

Many rex begonias are unsatisfactory as house plants because their normal period of growth is during the summer, and it is their nature to drop their leaves and rest during the winter. These varieties can be used as summer garden plants in warm, humid parts of the country.

However, a number of varieties do continue to grow during the winter, and these can be used as house plants if the conditions necessary for their growth can be met. Varieties handled by florists are likely to be winter-growing varieties.



REX BEGONIA-
ORIGINAL FORM

The original rex begonias grew in nature under trees and other plants where they were shaded from the sun. It was a warm, moist habitat and the air was very humid. Soil was loose, with much organic matter in the form of leaf mold and partially decayed leaves. To grow these plants successfully, we must try to duplicate these conditions.

Temperature is not a problem since rex begonias like to be warm, but the warmth must be accompanied by high humidity.

Anything that you can do to increase humidity will benefit a rex begonia. Frequent spraying of the leaves with a fine mist or a gentle rinse under an open faucet is beneficial. Use water that is room temperature or barely lukewarm – never cold. Grow the plant on a pebble tray, or near open containers of water which can evaporate into the air near the plant. A very large brandy snifter can house a rex begonia.

Rex begonias require the least light of the begonia group, in part because they are plants of the shady forest, in part because we are interested in their leaves rather than their flowers. They should never be exposed to the sun.

Keep the soil evenly moist at all times, but be sure that the pot has good drainage so that the delicate roots do not decay from standing in water.

There are as many different rex begonia soils as there are rex begonia growers, but they are all loose with a high proportion of leaf mold or other humus. Coarse sand will help to lighten the soil and provide good drainage.

During the growing period, feed a rex begonia about every two weeks with plant food mixed to half the recommended strength.

Keep the plant out of drafts and protect it from sudden temperature changes.

Rex begonias are usually propagated by leaf cuttings. Any good house plant book will give detailed instructions for this method of propagation.

It is not easy to grow a rex begonia in the average home, but it can be done. Remember that it is a plant of the tropics and that it needs warmth, humidity, and protection.

ANGEL WING AND RICINIFOLIA BEGONIAS

Two large begonias which have been favorites for many years are the angel wing and ricinifolia begonias. Both of these begonias are valued for their attractive leaves as well as for their beautiful flowers.

Neither is difficult to grow, but they do become very large, particularly the ricinifolias. When these plants become too large, new plants can be started from cuttings and the old plant discarded or, hopefully, passed along to a friend whose house can accommodate a very large begonia.

Angel wing begonias have oblique leaves which are rather long and narrow. Because of their shape and arrangement on the stem, they are thought to resemble the wings of angels in medieval paintings – hence the common name. The stems are thick and bamboo-like or cane-like. The internodes between the leaves are long so that the leaves are spaced rather far apart.

The original angel wing begonia, *Begonia coccinea* Hook., had dark green leaves and scarlet red flowers. Many varieties have since been developed. Some have leaves with silvery spots which make them very attractive. Flowers, which occur in drooping axillary clusters, may be red, pink, or white.

Because angel wing begonias naturally grow tall, it is necessary to prune them for shape and to control their height. When a plant has reached a fairly large size, it is advisable to prune out old hard, woody stems after flowering. The plant will put out new growth to replace the old stems.

Angel wing begonias should be rested after the flowering period is over. Keep the soil dry – but never to the point of wilting. Resume normal watering when signs of new growth appear.

When watering an angel wing begonia, allow the soil to dry to the touch between waterings. If the soil is kept too wet, the plant will drop its leaves. The soil should be light and porous so that excess water drains away, but it should contain enough humus so that some moisture will be held.

Although easy to grow, angel wing begonias cannot stand drafts or sudden changes in temperature. If the air is too dry, leaf edges will dry and turn brown. Some sun is necessary if the angel wing is to bloom.



RICINIFOLIA

Begonia ricinifolia, *Begonia ricinifolia* A. Dietr., is a very old hybrid resulting from a cross made in England in 1847. It has very large leaves on long hairy leaf stalks. The leaves resemble castor bean or *Ricinus* leaves in shape, and this is the reason for the name ricinifolia. If you are not familiar with the leaf of the castor bean, the leaves are lobed somewhat like maple leaves.

Ricinifolia and its varieties are always attractive because of the leaves and their hairy stems, which have conspicuous red hairs in rings around the stem.

When in bloom, ricinifolias are truly lovely. The flowers are produced in very large drooping clusters and are red or pink. Normal blooming time is late winter or early spring, and the flowers last a long time.

The leaves arise from a thick, somewhat erect rhizome or rootstock which becomes prostrate in age. In an old plant, the rhizome may be long and barren. A plant in this state should be rerooted.

BEEFSTEAK, IRON CROSS, CLEOPATRA, AND LADY MAC BEGONIAS

No discussion on begonias for the indoor garden would be complete without at least a brief mention of an old-time favorite, the beefsteak begonia; a comparative newcomer, the iron cross begonia; the dainty Cleopatra begonia; and the gorgeous Lady Mac Christmas begonia.

Beefsteak begonia resulted from a cross made in 1847. At that time it was given the name *Begonia erythrophylla* K. G. Neumann. It is now often listed as *Begonia feastii* Hort. Several varieties are known.

Beefsteak begonia was at the height of its popularity a generation ago, but it is still a favorite plant of many indoor gardeners.

It has large, round leaves often described as resembling pond lily leaves. They are shiny and dark green above and red beneath. Because of the shape and color, one can imagine a resemblance of the underside of a leaf to a slice of round steak. Perhaps this is the reason for the not too appealing common name.

Beefsteak begonias are rhizomatous begonias. In culture, the rhizome should grow on top of the soil in the pot, sending roots down into the soil. The plant is shallow-rooted, so that a shallow pot is most suitable.

In late winter or early spring, pink flowers are produced in large clusters. Some sun is necessary if the plant is to bloom. Beefsteak begonia is easy to grow and will tolerate much abuse. Keep the soil on the dry side. Wash the leaves often to keep them shiny, beautiful, and healthy.

Beefsteak begonias become very large with age, but young plants of a suitable size can be kept by starting new plants from rhizome cuttings or from leaf cuttings.

Iron cross begonia, *Begonia masoniana* Irmsch., is a large foliage begonia with a conspicuous cross-like pattern in the center of the leaf. The leaf is basically light green; the cross is reddish-brown.



IRON CROSS BEGONIA

Iron cross begonia is considered moderately easy to grow. It needs humidity, and if the air is too dry the edges of the leaves may dry and discolor. Be sure that the iron cross begonia is in a pot with good drainage. Water thoroughly, then let the soil dry before watering again. Never permit the plant to wilt or the leaves will be damaged.

Begonia 'Cleopatra' is a dainty, free-flowering hybrid quite popular at the present time. It is a medium sized begonia with long stemmed maple-like leaves variegated with brownish-red. Delicate pale pink flowers are borne in clusters.

Cleopatra is often recommended for use in hanging baskets, and can be used this way on the patio if the basket is protected from the wind. There is some danger in a hanging basket of the roots becoming too dry.

A humidity lover, Cleopatra begonia may fail if the air is too dry. Spray or rinse the leaves frequently. Some sun is necessary to produce flowers.

The beautiful Christmas begonia, *Begonia* 'Lady Mac,' is currently a popular gift plant at the Christmas season. Lady Mac begonias are not as well adapted to house culture as many other begonias, and it is often best to discard them after blooming.

However, if you can't bear to throw away this lovely plant, cut it back severely after blooming. The plant will put up new growth by summer, when the pot should be sunk outdoors in partial shade and left until early September. Make cuttings from the parts you pruned off and start new plants. New shoots which appear at the base of the plant are very good to root as cuttings.

Lady Mac begonias need some sun but not full exposure; moderate watering; moist atmosphere and cool location.

Consumer Protection from the State Level

Ken Wilmore

It is one of those beautiful spring days, a day that makes you feel like doing some planting in your yard. Throughout the long winter months you and your wife have discussed what you will need to enhance your landscaping and now the day is here.

You load the family in the car and are off to your favorite nursery where you select a lilac to fill that void across the back fence; the new All-American rose is a must and you also order a nice pinon pine to block the view of the trash can from your patio.

All you have to worry about now is that with a little tender care, these items will grow and bring you the satisfaction you expect.

What you don't realize however, is the protection you have had from the Colorado Department of Agriculture. This assures you that the nursery stock you bought is alive and in growing condition, properly graded, free of disease, and meets all of the quality standards set forth in one of the finest nursery laws in America.

Some years ago Colorado was known as a dumping ground for "trash" nursery stock from all over the country. The homeowner was fair game for the unscrupulous nurseryman, tree peddler, and con man.

Colorado was in trouble in those days for it was trying to get along with an antiquated law with very few provisions for consumer protection. Everyone was in the business then and often the quality of nursery stock offered by retail outlets was unbelievably poor.

Willard Snyder, now retired, was chief of the Plant Industry Division of the Department of Agriculture and realizing the problems facing the legitimate nurseryman and consuming public, called in people representing every phase of the nursery industry for consultation in writing a new law. The result was the Colorado Nursery Act of 1965 that was soon passed by the Legislature. It has had several minor revisions since that time and Colorado now has one of the most effective nursery laws in America.

Most nursery stock sold in Colorado is grown by out of state nurseries. This stock is not only inspected at the local nursery, but must have a certificate of inspection from the point of origin. Also every wholesale and retail nursery shipping into the State must be licensed by the Colorado Department of Agriculture.

All Colorado nurseries and nursery dealers must be licensed and are subject to periodic inspections by the Department of Agriculture. If any infractions of the law are detected the material is condemned and put on stop-sale immediately. This procedure has had immediate and far reaching results and has been accepted with enthusiasm by the legitimate nursery dealers in Colorado.

The data listed will show how effective this program has been in the past three years.

An interesting side note is that of the total number of condemned stock indicated below, less than 1% was from the professional nurserymen (members of the Colorado Nurserymens Association.)

	1968-1969 ACTUAL	1969-1970 ACTUAL	1970-1971 ACTUAL
Number of dealer inspections	732	598	623
Number of nursery inspections	105	96	136
Number of plants inspected			
Evergreens	99,465	131,803	141,781
Shade Trees	15,043	31,360	22,344
Fruit Trees	8,412	17,965	15,427
Ornamental Trees	5,014	14,734	11,112
Shrubs	62,589	88,762	65,528
Roses	87,734	75,568	82,452
Vines	3,082	4,976	2,992
TOTAL Inspected	281,339	365,168	341,636
Number of plants condemned			
Evergreens	6,184	4,305	2,257
Shade Trees	812	2,162	1,218
Fruit Trees	705	823	302
Ornamental Trees	203	1,662	386
Shrubs	2,781	10,232	1,527
Roses	4,594	4,992	2,038
Vines	85	285	27
TOTAL Condemned	15,264	24,461	7,755

CHILDREN'S GARDEN PROGRAM 1971

Beverly Pincoski

The "big day" was September 11 – the day of the Garden Fair and Graduation, the culmination of a full summer of work and fun. The Fair was colorful with long rows of tables lined with plates of vegetables including beets, tomatoes, turnips, beans, carrots, cabbages, onions, cucumbers, squash, bouquets of marigolds and zinnias and, of course, the gigantic sunflowers. Some had blue ribbons attached showing that they were the best of their group. The graduation ceremony was a special event. All of the children who completed the program were presented certificates and those select six that had the best gardens were given trophies. Parents, relatives and friends were on hand to join with the children on their special day. As they say "a good time was had by all."





It all began last April. The beginner gardeners, those children who were new to the program, were given class instruction to acquaint them with gardening procedures – planting seeds, transplanting, cultivating, weeding, thinning, watering and the use of tools. Each child designed his or her own 10′ x 10′ plot. No two gardens were alike. The advanced gardeners, children who participated in last year's program, had one class session to review important points and to work on their garden plot designs.

Actual outdoor gardening work was started in mid-May. Have you ever seen 128 children brandishing hoes, shovels and rakes? Things were calmer in a few weeks after the seeds were put in the ground and the little plants of tomatoes, cabbage, cauliflower, eggplant and broccoli were transplanted.

Lectures were held throughout the summer on various topics that pertained to gardening. Dr. James Feucht, Area Horticulturist for Colorado State University, led off with an informative talk about ecology. The second lecture was about library books and was presented to the children by Mrs. Marshall of the Park Hill Library. As we have a children's section in our own library we encourage the children to do some summertime reading. Insects, a topic which is always interesting to the children, followed on the lecture schedule. This was given by James Schell of the Denver Botanic Gardens staff. Herb Gundell, County Extension Agent, was the next speaker and he answered general and varied questions that the children had about gardening. As in previous years the last lecture was about preparing vegetables and flower displays for the Garden Fair. This was given by Mrs. Ralph Claiborne, Colorado Federated Garden Club judge.

Have you ever eaten Louisiana eggplant casserole, carrot cookies or had Chinese spinach soup? These and many more interesting dishes were served at the summer potlucks. This function began several years ago and has gained increasing popularity. The potluck lunches were held in June and August. The children bring dishes prepared totally or in part with vegetables from the garden. The July potluck was a variation on the theme and was called Dip Night. Raw vegetables were served with numerous and different flavored dips.

During the summer the gardens were judged three times on the following items: weeding, thinning, harvesting, variety of vegetables planted, use of space, replanting, cultivating and overall appearance. Final winners were – Beginner: 1st – Pat Jezek, 2nd – Dix Baines, 3rd – Drew Hamrick; Advanced – 1st – Terry Ruby, 2nd – David Vittetoe and 3rd – Scott Ruby.

The gardening season came to an abrupt halt with the 15″ mid-September snowstorm, so clean-up day came a little sooner than expected. It was sad to see the sunflower stalks broken or lying flat on the ground. They had been so tall and majestic and throughout the summer were always a symbol that marked the place where the children did their gardening. The children will be back next year and so will the sunflowers.

Visiting the habitat of some of the conservatory plants

Richard R. Inglis

Our Conservatory and Gardens should give many plant lovers a desire to get more involved with the great riches of the plant kingdom. One direction that a person might choose is to see some of these plants in their natural habitat. Since Florida has much the same climate that is maintained inside of the Boettcher Memorial Conservatory, the horticultural gardens of Florida are a logical place to pursue further study. Such gardens are numerous and beautiful and not only are the plants more natural, but it is always interesting to run across an old friend first discovered in the Denver conservatory.

The glamour of the plant explorer – of searching around the world for beneficial plants – can be found in Florida. The Fairchild Tropical Gardens is one of these exotic collections near Miami. The estate belonged to Colonel Robert Montgomery who especially fancied palms. There are 500 kinds of palms and cycads found in a beautiful setting. Over 2500 species of plants are grown there including many unusual varieties.

A lesser known plant explorer was Henry Nehrling whose gardens, formerly called the Caribbean Gardens and now more popularly known as Jungle Larry's Safari, are located at Naples. A small zoo is the incentive to attract the tourist but many of Dr. Nehrling's botanical curiosities that he started importing in 1918 are still to be found. The collections of 3,000 bromeliads and 10,000 orchids (epiphytes or air plants) are outstanding.

The Edison estate at Fort Meyers, now operated by the city, is another wonderland of the subtropical environment. Mrs. Edison loved gardens and was instrumental in starting many garden clubs. Harvey Firestone brought a banyan fig to her in 1925; with all of its drooping roots, the tree now measures 200 feet wide.

South of Miami near Homestead is the Orchid Jungle, also known as the Fennel Orchid Company. They claim to have over 4,000 hybrids and species of orchids as well as many other exotic plants. This family has innovated many things in orchid raising. They claim to have the largest outdoor orchid collection in the United States and perhaps the largest variety of orchids in the world.

Another type of Florida's horticultural displays are the beautiful formal gardens on some of the great estates. At Vizcaya there are 10 acres of Italian style gardens designed by Diego Suarez. This James Deering estate in Miami, with its magnificent art treasures, is one of the outstanding show places in the state.

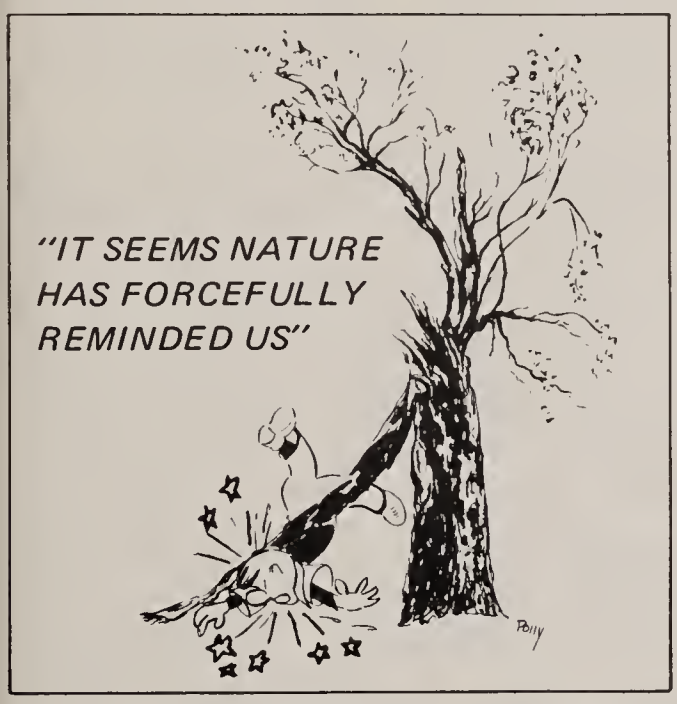
The Ringling estate in Sarasota represents what can be done with wealth and the attractive climate of a warm, humid environment. Busch Gardens in Tampa are particularly famous for the zoological gardens, but the subtropical plantings help make this an outstanding

tourist attraction. The Japanese Gardens on Watson Island in Miami are unique, for here subtropical plants are used to create the effect that traditional temperate climate plants commonly give this kind of landscape architecture.

One of the most famous tourist attractions of Florida is Cypress Gardens. The water skiing show has made this area a national attraction but a plant lover would probably find the gardens even more appealing. I found myself thinking that it was great to have the water skiing attraction to help pay for the huge staff needed to take care of the plant paradise. Here a sink hole lake in the limestone substrate had a cypress swamp on one side. R. D. Pope had the foresight to see what a beautiful spot a murky, impenetrable bog could become.

Much of the more common vegetation in Florida is lovely also. The camellias and azaleas in bloom from January to March, help add to the grandeur of the winter and spring season in our most southern continental state.

After looking at all of these beautiful gardens, a conservatory becomes even more interesting for it brings far away places, represented by the plant world, to our own door step.



Disaster in Denver

Wes Woodward

At the beginning of October 1969 the weather was warm, the sun shone every day, flowers bloomed luxuriously, the trees, in full leaf, were beginning to turn to red and gold, and Denver was entering another of its famous Indian summers. Then, on October 4th, came the snow – a heavy wet snow, clinging to the trees and bushes. Limbs bent, and broke, came crashing down. The flowers were buried and destroyed. Scarcely a tree or bush escaped severe damage. One week later there was another storm, a heavier snow, and trees, already weakened, broke again and again.

Disaster enough, but the extent of the damage was not realized at first. On October 4, the temperature dropped spectacularly from 80° to near zero. That hadn't happened before and it was a while before we recognized that the temperature drop was the real destroyer. The trees and bushes were full of sap and had not begun to harden off

for winter. They froze – literally froze. Many of them died at once. Others leafed out in the spring, struggled briefly, and gave up in the summer heat. The extent of that damage is still being felt, two years later. Trees and parts of trees are still dying, and others are weakened, although still surviving.

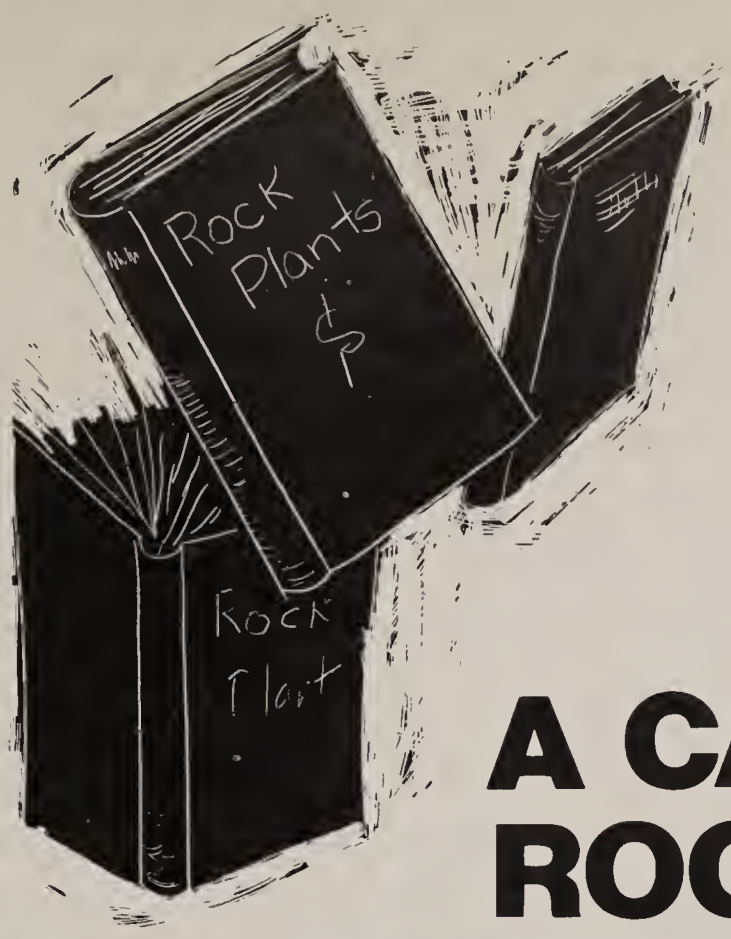
As if this was not enough, the dread Dutch Elm Disease arrived in Denver at about this time. The broken and lifeless elm limbs presented an ideal hatching place fo the elm bark beetles which carried the disease. For two years, now, the disease has been spreading rapidly and there has been a desperate campaign to get the dead elm wood out of the trees and wood piles and into the dumps and fires. Some experts feel that it is a hopeless campaign, that Denver will lose all of its estimated 185,000 elm trees. Others are hopeful that some cure will be discovered before all the elms are gone, or that the disease destruction can be stalled long enough to get different and disease-immune trees established in the city before it is left treeless and barren.

The snow damage of 1969 had been mostly repaired; the freeze damage had nearly run its course; and the disease damage had been accepted and provided for, as best we could, when Denver entered another of those pleasant autumns in September, 1971.

You know what happened. Here came another big, unseasonable snow. The tree branches sagged, snapped and broke. The next phase of the progressive disaster had come. All of it, together, seems like just too much.

It seems to me that nature has forcefully reminded us that trees don't grow naturally on this high prairie. Mostly because we don't have the water, but partly because of the sudden changes in temperature and weather. When early explorers traveled through the Platte-Cherry Creek area 125 years ago, they called this treeless country the Great American Desert. The newspapers and the Chamber of Commerce have, ever since, been indignant about this vile slur. The people who love trees and flowers and everything that grows, have been practical – they accepted the desert for what it is and have gone cheerfully about creating an oasis. The horticulturists, professional and amateur, have been so successful that newcomers are hardly aware of the true nature of the high plains, and the rest of us often forget.

But the continuing tree disaster has revealed another thing about the people of Denver. Most of them are not much concerned about what happens to our trees and shrubs, or our flowers either. They are so involved with automobiles and television and their finances that they hardly notice what is happening to the oasis. "Why do you try to grow all those things?" they ask. "I don't have them and I don't need them." That, I think, is sad. It tells us that most Americans have been conditioned by a technical, scientific society to the point where they no longer are related to the earth, its plants and animals, and its beauty. A hundred years ago our books, our poems, our art were full of the appreciation of nature. That world is gone. It was, I think, a far richer and more satisfying world than the concrete-plastic-asphalt mechanical world we live in. It is sad that most people gave up so much for so little.



A CATALOG OF ROCK PLANTS AND GROUND COVERS

Suzanne Ash & Bernice Petersen

Give a man the secure possession of a bleak rock and he will turn it into a garden; give him a nine years' lease of a garden and he will convert it into a desert —— Arthur Young.

During the past 8 years members of the plant sale committee at Denver Botanic Gardens have been striving to deter that man with the 9-year lease; more specifically, those who dispense rock plants and ground covers there have been offering guidance to him with the bleak rock.

Here along the Front Range rock gardening is a natural with rocks naturally close by and hundreds of homes situated on natural slopes. Rock gardening is one of the most esthetic approaches to landscape design and plant appreciation. Even a postage stamp garden, with rocks and plants in proper scale, can delight the most discriminating plant hobbyist. Some, reasoning if a little is good a lot is better, are "doing what comes naturalee," building a garden on half an acre or more with rocks carefully chosen and skillfully (?) placed.

With urban sprawl, attempts to build replicas of gardens found in our nearby mountains or gardens of the Southwest desert have become increasingly popular. To conserve water, time and energy ground covers (with or without crushed rock) have been substituted for lawns. Providing a variety of plants that will adapt or thrive under these extreme conditions has been the pleasure of those managing the rock garden booth at the annual plant sale. Over the years this list has grown to more than 100 kinds of plants: choice, perhaps tender, hardy or robust. True rock plants are mostly perennials. Although a wide assortment of plant varieties in a garden is fascinating and desirable, restraint is actually difficult and necessary.

Following is a catalog of plants offered mainly at the Rock Garden and Ground Cover Booth. Not all have been available in a given year. A few are found at the Herb Booth while others are handled in Perennials. Many plants have been grown especially for the Plant Sale at Denver Botanic Gardens, traditionally preceding Mother's Day. Descriptions and cultural hints have been assembled primarily as aids to the volunteers in Rock Gardens and posted for information of its customers. Novice gardeners as well as seasoned hobbyists have found them helpful, even educational.

New to the collection of plants this year will be two natives:

Dodecatheon pulchellum. Western shooting star. Clusters of bright pink flowers with dark colored anthers grow on leafless stalks. (Exclamation points in living color.) The plant has basal rosettes of bright green leaves. It likes moisture, rich loamy soil and good drainage.

Townsendia exscapa. Easter daisy. A mass of white or pinkish flower heads nestle in a dense tuft of narrow greyish leaves. Once established in the garden, in average soil with average moisture, this little gem thrives, even reseeds. As the common name implies, bloom is usually in April and into May.

Aethionema pulchellum. Persian candytuft. Bluish-green year-round foliage. Heads of soft pink flowers on a tiny shrublet about 6 inches high and 6 inches across. Thrives in sun, stands drought. Happy in walls and will reseed. Blooms mid-May to June.

Ajuga reptans. Bugleweed. Foliage: green, purplish or variegated. Flowers: blue, pink or white. Excellent ground cover in sun or shade. creeping, can be troublesome.

Alyssum montanum. More ground hugging than *A. saxatile* known as basket-of-gold. Lemon-yellow fragrant flowers above compact and spreading grey foliage. Stands heat and drought. Common in the Alps. *A. saxatile compactum,* a dwarf strain of basket-of-gold, is neat in pavement planting and an effective edging plant.

Androsace spp. Rock jasmines. Short stemmed rose or white flowers in early May from rosettes of tiny leaves. Like moisture and light shade. Mulching during winter months might be helpful.

Anemone patens. Our native pasque flower. Furry buds produce lavender blossoms in late April and May. The feathery seed heads are equally attractive. Plant in open in average well-drained soil.

A. sylvestris. Snowdrop windflower. Satiny white cup-shaped flowers up to 1½ inches across bloom in early May. Likes light shade. Reseeds. Easy.



ANEMONE

Antennaria spp. Native pussytoes. Silvery-grey ground cover with May flowers in white or pink resembling little catspaws. Grow in average soil, prefer good drainage. Leaves remain all winter. Excellent between flagstones, even on a south exposure.

Aquilegia caerulea. Colorado columbine. Prefers part shade, rich soil. Will hybridize with other colors if they are nearby.

Arctostaphylos uva-ursi. Native kinnikinick. Broadleafed, trailing evergreen ground cover with dainty urn-shaped pink and white flowers followed by scarlet berries. Prefers good drainage and light shade. If planted in bright sunlight provide some light winter mulch.

Arenaria montana. Sandwort. Moss-like foliage with white flowers larger than our native. Grows in partial shade. Good between flagstones.

Armeria laucheana. Sea pink or thrift. Rose flowers, on 4-inch stems above grassy, tufted foliage, bloom in May or June. Sun or light shade. Protect in winter from drought and sunburn.

Artemisia schmidtiana nana. Silver Mound. Low, soft silvery foliage forms broad attractive mounds. Will grow in full sun, sandy soil. Prune or cut back vigorously in spring.

Asperula odorata. Sweet woodruff. Excellent plant for shaded areas. Interesting whorled leaves with little white star-like flowers. A perennial herb, dried foliage is fragrant.

Aster alpinus. Purple, blue, white or pink blossoms with bright yellow centers in May and June. Sun and average soil.

Aster spp. Goliath Blue, Dark Beauty, Warburg Star. Hardy fall asters bloom when few other flowers blossom.

Brunnera macropylia (Anchusa myosotidiflora). Dainty blue forget-me-not flowers on 12 inch plants. Fragrant. Shade.

Cactuses. Most are appropriate in many shapes and sizes.

Campanula carpatica turbinata. Flowers larger than *C. carpatica,* white or blue. Plant grows 4 to 6 inches high.



CAMPANULA

C. cochlearifolia. Fairies' thimbles. Small rambling plant with tiny hanging bells in lavender or white. 2 to 3 inches high.

C. garganica. Excellent plant. From a rosette of small ivy-shaped leaves grow many flowering sprays bearing starry-blue flowers with white eyes. Blooms in mid-June. Prefers light shade and good soil. Foliage evergreen.

C. portenschlagiana (muralis). Light blue-purple bell-shaped flowers. Likes moisture and well-drained soil, part shade or east exposure. One of the best.

C. poscharkyana. Larger than *C. garganica.* About 6 inches high with long trailing stems. Masses of large wide-open violet-blue stars in May and June. Easy in well-drained soil; might be too vigorous in rich soil.

Carlina acaulis. Stemless thistle of the Alps. Dwarf perennial with silky white flower heads about 2 inches across, which dry beautifully.

Convallaria majalis. Lily-of-the-valley. Good ground cover in difficult shady areas. Prized for its fragrant, delicately scented, white bell-shaped flowers. Can be invasive.

Cotoneaster dammeri. White flowers followed with bright red berries. Lustrous evergreen leaves on this prostrate shrub. A possible substitute for kinnikinick.

Dianthus caesius. Tiny, sweet-scented rose-pink carnations bloom in May on low cushions of glaucous leaves.

D. deltoides. Flashing Light. One of the maiden pinks. Good winter foliage, useful in walls. Use sparingly in small garden.

D. plumarius. Grass pink. Bluish-grey foliage, flowers rose-pink to purplish or white, some variegated colors. An old garden favorite.

D. 'Tiny Rubies.' Miniature red carnations on tufted green foliage. Plant in average soil with average moisture.



DIANTHUS

Dicentra eximia. Fringed bleeding heart. Flowers nodding, pink. Good in shade. Can spread.

Draba repens. Yellow flowers cover bright green foliage on this low growing plant. Likes gritty soil and full sun. Might endure shade. May flowering.

Eriogonum spp. Native sulphur flowers. Mat-like covering good on slopes. Foliage remains ever green or ever grey. Cream, yellow or deep yellow flowers in umbels. Poor to average soil. Little water.

Euonymus fortunei colorata. Good evergreen ground cover. Low creeping species, about 6 inches tall, spreads rapidly and has excellent

purple fall color which lasts most of the winter. Thrives in shade but endures sun.

Euphorbia epithymoides (polychroma). Spurge. Conspicuous chartreuse-yellow bracts, incorrectly termed flowers, appear on 8 to 12 inch stems in early May. Foliage turns crimson in autumn. Grows easily in full sun and in well-drained soil.

Festuca glauca. Blue fescue grass. Silvery-blue tufts form interesting clumps. Divide or replace every 3 to 4 years. Average soil and moisture. Effective edging plant.

Fragaria spp. Runnerless strawberries, Baron von Solemacher (red) and Alpine (yellow) delight the eye as well as the palate. Eight to 12 inch clumps also useful as edgings. Wild strawberry, *F. ovalis*, bears delicious fruit and covers difficult areas.

Geum borisi. Avens. Yellow-orange flowers on 8-inch stems. Light green crinkly leaves about 4 inches across are almost as pretty as the flowers. Plant in sun in light soil.

G. 'Scarlet Gem.' Introduced last year. Taller than above with red flowers.

G. triflorum. Pink plumes. Native. Urn-shaped blossoms, usually 3 on a stalk, with yellow or whitish petals protruding. Fruit is composed of silky- rose colored plumes. Light shade or open sun with adequate moisture and good drainage.

Globularia cordifolia. Globe daisy. Lilac-blue globes about half inch across on 3-inch stems. Light shade and well-drained soil. Different.

Gypsophila repens. Dwarf babys breath. Low creeping bluish-green leaves profusely covered with small white or pinkish flowers. *G. repens rosea* is a pink variety. Good in walls or rocks, will endure sun and little moisture.

Helianthemum nummularium. Sun rose or rock rose. This little shrublet likes our alkaline soil, has deep green foliage that remains all winter. The bright single or double rose-like flowers are white, pink, rose, yellow or apricot. Prefers a sunny position and good drainage. Should be cut back after flowering to bloom again in the fall.

Helleborus spp. Christmas roses and Lenten roses. Bloom when little else in flower, December to March. Flowers white to greenish to deep purple. Excellent evergreen foliage. Successful in deep, rich loam, well-drained and in half shade. Slow to establish but sometimes reseed.

Heuchera sanguinea and splendens. Alumroot or coralbells. Handsome rosettes of scalloped leaves with numerous red, pink, white or coral flowers on elegant spikes. Hummingbirds find the bright red blossoms attractive. Plant in full sun or partial shade.

Hypericum reptans. St. Johns-wort. Trailing species. During July and August bears very large soft yellow flowers with conspicuous reddish stamens. Full sun.

Iberis sempervirens. Candytuft. Evergreen foliage covered in May with heads of white flowers. Little Gem is an exceedingly dwarf variety.

Linum flavum. Golden flax. *L. narbonnense* and *perenne* have sky-blue flowers. Narbonnense has white eye and lasts throughout the day. All 1-2 feet high and grow in poor to average soil.

Mahonia repens. Native hollygrape. Good in sun or shade, drought or average moisture. Will grow 12-15 inches high but stands vigorous pruning. Yellow clusters of flowers in early spring are followed by blue berries attractive to birds and delicious in jelly.

Nepeta mussini. Catmint. Blue flowers on grey foliage about a foot high. Bees like it and it likes a hot, dry location.

Oenothera coronopifolia. Cut-leaf evening-primrose. White flowered species found along roadsides in foothills and lower montane zones. A charming plant in hot dry areas.

O. missouriensis. Immense yellow blooms over a long flowering season.

Papaver nudicaule. Iceland poppy. Sweet-scented, delicate flowers about 2 inches across in satiny colors ranging through white, yellow, orange and red. *P. alpinum* is more delicate and shorter stemmed. Planted in a sunny position in well-drained soil, both bloom over long periods.

Penstemon alpinus. Native blue flower on 6 to 10 inch spikes.

P. barbatus. Red blossoms on spikes 18 inches or taller.

P. crandalli. Native creeper blooms in early May on hot dry slopes. Blue flowers.

P. pinifolius. Native to New Mexico, Arizona and adjacent Mexico. Dark green needle-like leaves, resembling tiny junipers, form mats up to 30 inches across and when in bloom are densely covered with vermillion red spikes 6 to 8 inches tall. In winter the foliage assumes a bronzy hue.



PENSTEMON

Phlox divaricata. Wild sweet william. Attractive blue flowers appear in early May. Native in eastern North America. Prefers rich soil and partial shade. Plants about a foot tall.

P. subulata. Ground pink, actually phlox. Its mats of evergreen needle-like leaves are densely covered in May with white, pink, blue, magenta or red flowers. Stands full sun, prefers light mulch in winter to prevent burning. Transplants or divides readily after blooming.

Polemonium humile. Jacobs ladder. Blue flowers in clusters on interesting foliage. Blossoms in May in partial shade.

Potentilla aurea verna. Small golden-yellow flowers on low growing plants with strawberry-like foliage. *P. tonguei* blooms a little later. Both thrive with average care and bloom in May.

P. nepalensis. Raspberry-pink flowers on 12-inch stems blossom in July.

Primula acaulis and *P. polyanthus*. Primroses. Some of the best shade plants in bright rich colors. Loose, humusy soil.

Santolina chamaecyparissus. Lavender cotton. Aromatic shrublet with evergrey foliage. *S. verna* has bright green foliage. Both have yellow button flowers, stand shearing and are useful for formal hedging. Plants grow 12-15 inches across, start readily from cuttings made in late August.

Saponaria ocymoides. Soapwort. Creeping or trailing evergreen plants with bright pink blossoms. Good for sunny places in the rockery or on a wall. No special care.

Saxifraga bronchialis. Tiny evergreen rosettes (about an inch across) with slight crusting on edge of leaves. Two-inch stems bear umbels of waxy-white flowers. Although it has been propagated for the annual plant sale this native is seldom commercially available. Grows in sun or light shade in average soil without too much water. A jewel!

S. cotyledon. Evergreen rosettes with silver crusted leaves and panicles of white flowers on 12-inch stems. The "rock breakers" prefer to be planted next to rocks or even in the crevises of rock walls.

S. umbrosa. London Pride. Scalloped leaves form neat evergreen rosettes with pink starry blossoms.

Scabiosa alpina. Dwarf pincushion. Small oval evergreen basal leaves deeply cut. Lavender-blue blossoms, miniatures of the old-fashioned pin cushion plant, flower on 3 inch stems. Light loamy soil, sun or light shade. June and July. Sometimes reseeds.



SCABIOSA

Sedum spp. Stonecrop. Succulents, more than 700 named species. Although most are appropriate the dwarf or creeping forms seem more suitable for the rockery. Mostly perennial and evergreen, their little star-shaped flowers, in terminal clusters, appear from early spring to autumn, depending on variety. Colors are usually white, pink, yellow and red. Foliage may be green, grey, variegated, or dark red. Most thrive in hot, dry positions, but *S. sieboldi* prefers some shade. Most propagate readily and are seldom pests since they have shallow roots.

Sempervivum spp. Hen and chix or houseleeks. Evergreen rosettes with various colored thick leaves. Primarily foliage plants they are found in greens, greys, reds and combinations of these colors, some are covered with cobwebs. Most bloom in summer and are propagated easily from offsets. They dislike rich soil or too much moisture. More delicate ones like partial shade. Many are winter hardy. Two or three planted in a crevice will multiply and form a filigree of rosettes. The column of flowers and "hen" dies after blooming but the surrounding chix carry on.

Silene acaulis. Dainty pink flowers of our high mountains. This moss-like plant needs gravelly soil, ample moisture and light shade.

S. zawadski. Deep green foliage that remains all year. Adaptable in full sun or part shade. Petals notched and white flowers are wheel-like

on 4 to 8 inch stems. From Austrian Alps.

Sisyrinchium brachypus. Tiny iris with grassy foliage. Plant in light, rather moist soil. Needs sunlight to blossom. Yellow blue-eyed grass?

S. montanum is our native blue-eyed grass. It requires well-drained soil, moisture and some sun to bloom.

Stomatium fulleri. One of the few hardy members of the Iceplant family (Mesembryanthemaceae). A succulent from Africa, the plant resembles a living rock. Its bright yellow flowers composed of numerous stamen-like petals are large in relation to the plant. Sunlight "turns them on," they open in mid-afternoon, flower all summer and until late fall (this season to mid-November). Plant in full sun with little water. Charming, a good subject for strawberry jars.

Teucrium chamaedrys. Germander. Shrubby perennial about a foot high with shiny, almost evergreen foliage. Flowers reddish-purple, less impressive than the foliage. Stands shearing, starts easily from cuttings. Sun or shade.

Thymus aureus. Golden thyme. Should have part shade, not as golden in full sun. *T. argentea*, silver thyme; *T. citriodorus*, lemon thyme; *T. lanuginosus, T. serpyllum* and others. All thrive in sun, moderate water, make excellent ground covers, good between stepping stones. Many are useful herbs in cookery.

Verbascum hybridum. Although related to mullein it resembles dwarf delphinium. Spikes of white, pink or maroon flowers about 8 inches tall. It succeeds in poor soil, requires little moisture, brightens barren corners or sandy slopes.

Veronica allionni. Evergreen foliage, low spreading mound covered with deep blue 2-inch spikes in late May and early June. Excellent under average conditions.

V. gentianoides. Deep green foliage (evergreen and gentian-like). Spikes of porcelain-blue flowers veined with darker blue. Good in rockery or used as border.

V. incana. Eight-inch spikes of deep blue flowers with grey year-round foliage. Other varieties (usually sold in Perennials at the plant sale) have white or pink blossoms.

V. pectinata. Hairy mat-like foliage, evergreen, with deep magenta flowers. Excellent in difficult places yet pleasing plant. Will stand full sun and drought. Quick spreading.

V. rupestris. Evergreen carpet similar to *V. allionni.* Some varieties have pink or white spikes 2-3 inches.

Yucca spp. Many sizes to be selected according to scale. *Y. harrimanni* is probably the smallest used in cultivation. *Y. glauca* is our native soapwort with greyish swordlike leaves and ivory tinged-pink blossoms. *Y. filamentosa* has taller stems and the most flexible leaves. *Y. baccata*, perhaps the largest grown in this area, has decorative curls along the leaf blades. Leaves can be dangerous (a common name, Spanish bayonet is indicative), but yuccas have an important place in horticulture in the Southwest. Blossoms should be sprayed with Malathion in June to rid them of aphis.

book review

Blunt, Wilfrid. *The Compleat Naturalist; a Life of Linnaeus.* New York, Viking, 1971. 256 p. $14.95.

This recently published biography enriches the already numerous collection of books on the prince of botanists, Carl Linnaeus.

The book is divided into three sections: Part One, The years of struggle, 1707-1735; Part Two, In search of fame, 1735-1738; Part Three, The prince of botanists, 1738-1778. Each part deals with a particular phase of the naturalist's life; the largest portion is allotted to his adult life, the productive time during which he developed the Linnaean classification and during which he published most of his works. The emphasis is on his accomplishments as a scientist although the reader is kept informed on the personal life of the subject. The author delves into his character to a great degree, even to the point of having Linnaeus' handwriting analyzed.

The serious student as well as the novice will enjoy this book. The former for enrichment and the latter as a well written, accurate introduction to the man and his impact. The book mirrors eighteenth century life, its character, its people and the development of the arts and sciences to this time.

Mr. Blunt quotes liberally from the works of Linnaeus and also from the writings of other biographers. He provides a bibliography, an appendix written by William T. Stearn, a leading authority on Linnaeus, of the Natural History Museum in London. This appendix is a short course on Linnaean classification, nomenclature and method.

Mr. Stearn provides locations of the Linnaeus collections. This would be particularly useful if one were contemplating a trip to Europe.

There is also a chronological list of the principal works of Linnaeus, with place of publication and those of which recent facsimiles have been made.

One's first impulse on seeing the volume is to look at the profuse illustrations, almost every page is illustrated, many with several drawings or pictures. There are 32 full page color plates. Also all the illustrations are identified and refer to the material within the immediate text. The author's style is clear to the point that it may seem repetitive. The print is somewhat small but on very good quality paper.

The book is available for circulation at the Helen Fowler Library.

S. H.

for your information

Our readers will be sorry to learn that James M. Schell, Horticultural Education Specialist has resigned from the Denver Botanic Gardens. He has accepted a position with Chemagro, a division of Baychem Company. There he will serve as Technical Service Representative and do field research in developing a practical and safe way of controlling weeds, insects and plant diseases by chemical means. This position will enable him to complete his requirements for the Ph.D. degree at Kansas State University at Manhattan. Our good wishes go with him.

FOCUS on EUPHORBIA PULCHERRIMA

in the
Boettcher Memorial Conservatory



Peg Hayward

The flamboyant poinsettia has become a symbol of Christmas, as no other plant exhibits such a brilliant display during the holiday season. It is not the flowers, but the bright red leaves or bracts that attract our attention. Golden cups in the center of these bracts are the flowers.

Of the vast genus *Euphorbia, Euphorbiaceae* family, with about 1600 species of latex-bearing plants growing in warm temperate and tropical regions, the most widely known member is probably the poinsettia, *Euphorbia pulcherrima* Willd., native to the moist, shaded parts of southern Mexico and Central America. The poinsettia was introduced to the world via the United States in 1828 by Joel R. Poinsett of Charleston, South Carolina, who was then United States Minister to Mexico. This monarch of the holiday season was named in his honor. The genus name and its family come from the Greek physician Euphorbus, and the species is from the Latin adjective *pulcher*, meaning beautiful or handsome.

E. pulcherrima has succulent, tender new growth which matures to a woody, shrublike structure. The plant may grow 10 or more feet high in its native habitat. Coarse, evergreen leaves produced on smooth, upright canes are variously lobed or entire and somewhat hairy underneath.

On close inspection, the flowers reveal a peculiar structural plan, one of extreme degeneration of the individual flower. The bright colored bracts surrounding the flower clusters serve to attract insects as pollinators. The bulky "flowers" with a lateral nectar gland may be mistaken for a single flower, but are complicated flower clusters. Less than a half inch across, each cluster is on a separate short stem and almost enclosed by green or yellow bracts, properly called an involucre. They protect a single short pedicel bearing a rudimentary three-lobed calyx and a pistil, and 4 or 5 more pedicels each with a single short stamen. The pistil has a three-lobed ovary and three styles, each cleft at the tip. This extremely modified flower cluster is characteristic of many *Euphorbiaceae* family members. Also common to the family is

the presence of milky juice, which is poisonous in varying degrees. The leaves of the poinsettia are very poisonous when eaten.

The poinsettia is a "short day" bloomer, that is, its blooming period is conditioned by the length of time it receives daylight. This accounts for the great regularity of its blooming period during the winter months, when the hours of the day are right for its appearance. It is known that brilliant street lights which prolong the lighted period have postponed the blooming period.

Horticulturists have concentrated on developing many variations of the scarlet poinsettia. As a result, there are now double forms and varieties where the red bracts are replaced with pink, white, and yellow in varying shades, as well as some with variegated leaves. The new hybrid Mikklesen variety makes a useful, long-lasting house plant.

For poinsettia care refer to article by Helen Marsh Zeiner in *The Green Thumb*, December, 1962.

Thanks to Bern Neil

In 1957 with membership in Colorado Forestry and Horticulture Association already in hand, Bern Neil, an enthusiastic herb gardener, arrived in Denver from Ohio. In November 1971 she moved on to California, leaving behind an impressive array of Garden-related accomplishments and a host of friends and admirers.

An exhibit of herbs at the first Colorado Garden Show, held a few months after her arrival, signaled the beginning of her volunteer activities in the Denver area – she had been active in The Herb Society of America for many years. With the formation of Around the Seasons Club in 1961, she began her volunteer service at Denver Botanic Gardens. Introducing herbs to the Botanic Gardens Guild was her privilege and it is probable that the present status of Denver Botanic Gardens among herb gardens in the United States is a direct result of this introduction. In sharing a zest for herbs she generously gave the recipe now used by the Guild for production of herb vinegar. She is a member of The Tussie Mussie Mesdames, a group who in 1969 published *a pinch of herbs*, a charming and practical little recipe book. This was sold for the benefit of the Associates.

Bern Neil's second – or should it be first? – preoccupation is with books. She is an avid collector for her personal library and shared this interest as well as some of her own books with the Helen Fowler Library. Appointed to the Library Committee in 1963, she has served continuously there and as a regular volunteer library assistant.

With the establishment of Associates of Denver Botanic Gardens she took on management of the book section of the Gift Shop. In more recent months she initiated and arranged two successful autograph parties for the benefit of the Shop and the Library. She also served as vice-president, two years as president and was a member of the Associates' board at the time of her resignation.

To round out this report, as a member of Around the Seasons she served as secretary, vice-president and president and with the transformation of the annual plant sale from an annual auction she was again involved.

And this brings us back to the original theme, "Thanks to Bern Neil." Thanks for her shared experience, her fresh ideas, her generosity and her loyalty to Denver Botanic Gardens.

May the best of everything be hers.

LMC, BEP

Exotics of COLORADO



European Weeping Birch,
Betula pendula . . .

Helen Marsh Zeiner

White-barked birches have long been popular as ornamental trees; of these, the European weeping birch, *Betula pendula* Roth., and its cut-leaved varieties are most often seen.

The white trunks are beautiful at any time of year, but they are most outstanding in winter when they are not masked by the leaves. The clean, chalky-white of the bark makes a nice contrast with evergreens.

Betula is the ancient Latin name for the birch. *Pendula* refers to the drooping or pendulous branches. Although the main branches are upright, the slender side branches are pendulous. The common name "weeping birch" is given to the tree because of these drooping or "weeping" branches. A graceful tree, weeping birch is the "lady of the woods" of English poetry; this is a common name sometimes used in Great Britain.

All birches have prominent lenticels or breathing pores in the bark which permit an exchange of gases with the atmosphere. In *Betula pendula*, the lenticels appear as elongated horizontal marks. Old trunks may have black clefts and large black marking which are conspicuous against the white bark. The bark is thin and papery and may sometimes peel, but this is not a pronounced feature as it is in the paper birch.

The slender, drooping branches and small leaves together with the white bark give a light, airy effect. The tree is medium sized and gives moderate shade.

Leaves of weeping birch are smooth, long-stalked, triangular, from 1 to 2½ inches long, long-pointed, doubly toothed, often straight or wedge-shaped at the base. In the commonly cultivated varieties they are also deeply lobed or "cut-leaved."

Birches are catkin-bearing trees. Male and female catkins are borne on the same tree. The female or pistillate catkins are about an inch long, narrow, slender-stalked, and cone-like in appearance at maturity, The fruit is a tiny winged nutlet. Female catkins disintegrate readily when the seeds are ripe, releasing the winged fruits to be carried by the wind far from the parent tree.

Male or staminate catkins, small and slender, are formed in the fall

and can be seen on the trees all winter. In the spring they elongate rapidly and shed quantities of yellow pollen. Birch twigs with male catkins are favorite twigs for forcing indoors.

Unfortunately, *Betula pendula* is a short-lived tree with a life expectancy estimated at 25 to 35 years. Weeping birch is subject to insect (particularly beetle) damage and the bronze birch borer is a serious enemy. *Betula pendula* prefers moist soil and is not drought resistant, nor is it frost-hardy on dry soil sites. Irrigation is indicated for this tree to ensure that it does not suffer drought damage. It is hard to transplant, and young trees are subject to sunscald.

These faults limit the usefulness of weeping birch, but with all its shortcomings, it remains popular because it is such a beautiful tree.

Betula pendula is a member of the birch family, *Betulaceae*. In addition to birches, the alders, hazelnuts, and hornbeams belong to this family. In Colorado, we have three native birches: *Betula papyrifera* Marsh., paper birch, which has a very limited distribution in Boulder county; *Betula glandulosa* Michx., bog birch, a shrubby high altitude birch noted for its brilliant autumn color; and *Betula occidentalis* Hook., river birch, a very common small tree with cherry-like bark found along streams from the foothills well into the montane zone. Our native alder, *Alnus tenuifolia* Nutt., is also a small tree common along streams where it often grows with river birch. Colorado also has a native hazelnut, *Corylus cornuta* Marsh., a shrub sometimes found along streams in the foothills of the eastern slope.

Betula pendula is native to Europe and Asia Minor to Japan. In its native habitats, it is a tree of many uses.

Books written in 700 B.C. were reputedly written on birch bark. From earliest times, the slender, flexible branches have been used to tie bundles of faggots for easy carrying. They have also been used as switches to punish recalcitrant children – "Spare the rod and spoil the child" often meant a birch rod.

In northern Europe, the weeping birch furnishes wood for fuel to heat homes. Charcoal is made from it. Hoops for binding casks were also made from birch.

A poor peasant, wearing birch wood shoes, might live in a humble home roofed with birch bark shingles and heated with a birch wood fire. His furniture might be made of birch wood, and he might sweep the floor with a broom made of birch twigs. He might sit at a birch wood table eating a simple meal with a birch wood spòon. If he was very poor, he might strip the inner bark from a birch, grind it, and mix it with meal for bread. In the spring, he might collect birch sap to make mead and wine.

Russian leather is said to owe its characteristic color and odor to tannin, a yellow dye, and an oil, all derived from birch bark.

The numerous tiny seeds are food for birds such as the ptarmigan in Lapland when other food is covered with snow.

Perhaps the most unique use of all for *Betula pendula* was, that in the days of powdered wigs, a powdery white material obtained from old bark was used to dust and whiten wigs!



Landscaping for the Denver Technological Center

Russ Rountree

The Denver Technological Center, south of Denver along Interstate 25, is rapidly earning a national reputation as an attractive headquarters center for large companies. Started in 1962 with 40 acres of farmland, and a thoughtful master plan, DTC has expanded to 850 acres and is host to more than 60 companies.

The success of the center is due in large part to a policy established early by its president, George M. Wallace. Landscaping was not to be treated as a luxury or nuisance, but as an absolute necessity. Bricks, boards and machines were to serve in a secondary role to people and plants. The basic plan for DTC is rigid in its insistence on a landscaping budget and staff three times that of most development projects.

Landscaping came first and plans for the placement, design and color of buildings followed, with strict codes that emphasize the importance of plant life and open spaces. Access streets into the complex are divided parkways, routed to keep traffic at a minimum and away from people. Divided intersections, with islands of trees, shrubbery and ground cover, allow traffic to flow smoothly and safely, and it is seldom that a pedestrian must cross a street or intersection. Sidewalks do not follow the streets. Parking areas are lined with trees and shrubs or are built into the buildings and there is no need for parking on or adjacent to the streets.

All utilities are underground – under the planted parkways.

The attention to landscaping is not a whim, but the result of sound economic planning. The park-like environment of the center is quiet, relaxing and conducive to creative work. Executives and all who work there are encouraged to enjoy the open spaces; to walk, exercise or picnic at any time, and many do. There are many kinds and varieties of plants to enjoy casually or selectively. The abundance of vegetation and the absence of traffic attracts birds and even rabbits. It is an environment that eases tensions and relieves the pressures of the business world.

In addition, there are more direct economic advantages. Buildings begin to deteriorate as soon as construction is complete, and they depreciate in value. Much of the money invested is lost over a period of years. During the same period, thoughtfully prepared, well maintained landscaped areas grow in beauty and desirability, and the value of open

areas appreciates. The land values increase as building values decrease.

The criteria for landscaping was established by Carl Worthington and Associates, consulting architects for Denver Technological Center.

In 1962, the DTC area was open and vulnerable to wind, storms and drought. Consequently the choice of trees, shrubbery and ground cover was from the more hardy plants. At the same time, material was chosen for seasonal color and for compatibility in mass planting forms to develop the character of the area.

The trees chosen included thornless honey locust, green ash and seedless ash, cottonwood, poplar, Russian olive, several varieties of flowering crabapple, ponderosa pine and Austrian pine.

Planting conformed to earth forms rather than strict geometric lines and patterns, on parkways and in building areas. The curving streets have the look and feel of colorful country lanes.

Shrubbery includes several different varieties of juniper and dogwood to blend well with sumac, golden elder and euonymus, offering color changes through the seasons.

Ground cover on parkways and in mass planting areas features a great deal of sedum, requiring little water or maintenance. Boston and Engelmann ivy, and vinca minor are also used near rock and planted areas close to buildings. Planted in bold, simple patterns, the ground cover tends to tie one area to the next.

Open spaces, near the developed portions of the 850-acre complex, are planted to park blue grass, and sprinklers have been installed. But there are still large portions of land awaiting development. These areas too receive attention and are not allowed to become rank weed patches. All trash has been removed and crested wheat and buffalo grass have been planted. Mowing through the summer months encourages the hardy grass and keeps weeds under control to present a clean, pleasant appearance until more colorful landscaping can be extended.

The original enthusiasm for extensive landscaping at DTC has not dwindled in nearly ten years; if anything it has grown. On other company land, 4 miles south of the center, a tree farm is planned. Initially a 30-acre plot will be planted to many different kinds and varieties of trees yet to be determined. The dual purpose plan makes use of barren, non-productive land, and at the same time enhances its appearance and value. Trees raised on this farm will be used for future landscaping at DTC and at the company's future Rampart Range development.

Planting at DTC is not limited to the ground level. Many of the same trees and plants seen on the parkways and other ground areas are also growing in special outside planting areas and in large wooden tubs on second and third story building plazas. An abundance of interior plants decorate offices, lobbies and hallways.

Plants and trees used in landscaping at the Denver Technological Center are hardy rather than exotic, and it is not the purpose of this report to claim special botanical skill. Instead, the purpose is to encourage others to consider the economic as well as the aesthetic advantages of thoughtful landscaping – environmental appreciation on two counts, and the long range results are pleasant to contemplate.

Meet the Dwarfs (Iris, that is)



Jack Riley

Almost all of us are familiar with the tall bearded iris, which usually bloom in a height range of from 32 to 36 inches, often about Decoration Day weekend in Denver. Ordinarily the tall bearded blooming period lasts about two weeks, depending upon weather conditions.

Many gardeners are loath to give much space to these plants due to the comparatively short flowering season. However, the iris period can be greatly extended, and this is where the dwarfs enter upon the scene.

First, a descriptive word about earlier iris. Below are names of the various kinds, which are listed in blooming progression.

Miniature dwarfs ranging from 3½ to no more than 9 inches
Standard dwarfs ranging from 10 to 14 inches
Miniature tall bearded ranging from 15 to 24 inches
Intermediates ranging from 15 to 28 inches
Border bearded ranging from 15 to 28 inches

In the Denver area, miniature dwarfs will begin to bloom anywhere from mid-March to the first of April, depending upon the end of the winter season. For example, in my own garden the first dwarf flower came on March 16, 1970, while it was on April 1 last year. Miniatures begin with little fellows standing only 3½ to 4 inches high. These are followed a little later by other miniatures ranging from 5 to 8 inches. Then as the miniatures cease, the standard dwarfs begin their bloom. The principal difference between miniatures and standards is that the miniatures actually have no stem; the blossom is borne on the perianth tube, which resembles a very short stem. Miniatures do not branch and have only one or two terminal buds to a stem. Standards have a true stem or stalk and in many cases have small branches. Standards should never have less than three buds per stalk, while four or five buds are considered desirable.

The intermediates follow the standard dwarfs closely in their bloom period. You will note that the general height range of the intermediates and borders is the same; however, their big difference is that they have a separate blooming season. Only the borders flower at the same time as the tall bearded iris. Hence, it naturally follows that the bloom season is a yardstick for deciding the classification of these two groups. Miniature tall beardeds are truly what the name implies for they must be perfect

miniatures in every respect. The stalk never exceeds the size of a pencil in diameter. Their flower is never larger than 3 inches in width and height combined. The miniature bloom season overlaps that of the intermediates and the borders. Actually, the most desirable height range for the miniature talls is from 20 to 22 inches.

But let us return to the dwarfs. They work splendidly in rock garden plantings. It is desirable to plant them where they will have an opportunity to multiply and grow into clumps. Clumps ranging from 6 to 12 inches in diameter will give vivid spots of color very early in the season. The color range is wide with many yellows and blues. Many of the yellows have very attractive brown spots on the falls. There are reddish miniatures and just recently some that border on pink have been introduced. There are many variations in purple and also in white shades which range from very light yellows to pale creams. The same color ranges extend throughout the standard dwarfs, a group of plants perfect for border planting. Again it is desirable to give enough space so that clumps develop. Details concerning the intermediates, the miniature tall bearded and the borders are not being given here, for we are primarily concerned with dwarfs.

The culture of dwarfs is indeed simple. As with all iris, they like good drainage. It has been pointed out that miniatures work splendidly in rock gardens, and this implies that it is unnecessary to give consideration to lifting and dividing at frequent intervals. Never plant the dwarfs, or any iris for that matter, with the rhizome more than 1 inch below the surface of the ground. When planting dwarfs, see that they are solidly in the ground and give them a good watering. Repeat the watering again in 5 or 6 days. The ideal time for planting all irises in the Denver area is in July and August. I like to plant or transplant early, to give them an opportunity to become well established before winter arrives. You may have read or heard that dwarfs often heave out of the ground near the end of winter and with the beginning of spring, when the ground alternately thaws and freezes. I have seldom had any difficulty with heaving and feel sure that it is due to this habit of planting early in the season.

You may have also read or heard at one time or another that no iris needs to be fertilized. This is truly a false statement, for there are few plants that do not need plant food or fertilization. Dwarfs, or any iris, for that matter, do not need a special fertilizer. Any good garden fertilizer is quite satisfactory. One that will not burn makes application much easier.

If you are not familiar with dwarf iris, may I extend an invitation to visit my own dwarf garden, located at 4284 Hooker Street, Denver, almost any time after the first of April. Of course, you may see the little dwarf blooms tufted with a recent snow, but that is to be expected when blossoms come so early in the year. Dwarf bloom is quite hardy – it takes a really severe freeze to damage it.

When winter has been long and you are tired of snow and ice, early dwarf iris is a marvelous spring tonic. Why not try a few in your garden soon?

Lecture Series 1971-72

OCTOBER 6, 1971 – Wednesday

Wildflowers – Getting to Know Them

Dr. Helen Marsh Zeiner Botanist

NOVEMBER 11, 1971 – Thursday

A Garden Tour in Britain

Dr. Gordon Alexander Emeritus Professor of Biology, University of Colorado

Mrs. Gordon Alexander Well-known lecturer to garden clubs

DECEMBER 9, 1971 – Thursday

Approaches to Insect Control

Dr. J. W. Brewer Assistant Professor of Entomology, Colorado State University

JANUARY 20, 1972 – Thursday

The Environment of Colorado – What is Happening to it.

Mr. Edward P. Connors Board Member, Denver Botanic Gardens

FEBRUARY 23, 1972 – Wednesday

Alpine Botanic Gardens in Europe

Dr. Beatrice Willard Vice-President Thorne Ecological Institute

MARCH 16, 1972 – Thursday

Iris – The Lazy Man's Flower

Dr. Carl Jorgensen Department of Horticulture, Colorado State University

APRIL 20, 1972 – Thursday

Ornamental Plants

Mr. George Kelly Horticulturist

MAY 18, 1972 – Thursday

The Use of Native Plants in Landscape Design

Dr. William Klein Department of Botany, Colorado State University

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

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ANNUAL REPORT ISSUE

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Cypripedium calceolus

Photo by Carol L. Radetsky

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The Green Thumb

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BIRD & BUSH

George R. Shier

Shrubs and trees have definite personalities that have specific appeal to particular species of birds. The Van Bibber Creek Water Gap in which we have lived for 20 years has a natural wealth of native shrubbery and some trees, many of which attract birds as well as being suitable for landscape plantings. We have used most of these native shrubs about our buildings and have come to value some of them for their special ornithological appeal.

First among the native shrubs, we prize the hawthorn, *Crataegus succulenta*, or its close relatives. This genus is irresistible to a wide variety of birds for protection, for food, and for nesting. The hawthorn becomes a small tree with numerous thickly twigged branches that bear attractive clusters of whitish flowers, followed by numerous clusters of tiny red apples in the fall. The leaves color with the frosts and are borne on attractive, dark, smooth twigs that have charm during the winter. For most warblers, hawthorn has no peer at our place. During spring migration, we look to hawthorn for the unusual warbler migrants, for the early kinglets and gnatcatchers. The fruit-eating birds throng amid its branches in the fall and during the winter it shelters the juncos and sparrows; our occasional mockingbirds prefer the hawthorn for nesting. *Crataegus* is a must for the bird garden. It is tolerant to a variety of soils and locations and should grow most places below the lodgepole elevations.

For those who have ample space for larger shrubs and trees, I must mention the box elder, *Acer negundo*. As a landscape tree, it is generally unloved by the property owner, but to the birds, it provides a local paradise. A mature box elder with its dense foliage, insect populations, hollow trunks, and its protruding dead limbs, will serve more species and numbers of birds than almost any other tree. We have two ancient box elders plus some younger ones in the Gap. Flickers, Sparrow Hawks, Lewis' Woodpeckers, House Wrens and probably other birds have nested in the hollow trunks. The major and minor branches always support nests. Warblers, vireos, and kinglets of every recorded species feed high and low in these box elders. The box elder should grow throughout the cottonwood belt and up the canyons.

For the small yard, there are three very desirable shrubs with attractive flowers, fruits, and fragrance, all adored by birds. These are the thimbleberry, *Rubus deliciosus* (named by Dr. James who was the first white man to ascend Pikes Peak in 1820 when the Long Expedition passed



Rubus deliciosus



Ribes aureum

that way), the golden currant, *Ribes aureum* and the chokecherry, *Prunus melanocarpa.*

Planted close to our buildings, the thimbleberry is a favorite nesting shrub for the Lazuli Bunting. It is a lovely white-flowered shrub with sweet, edible fruits and graceful spreading branches which look nice during the winter. It does not enjoy crowding. If watered, it makes a rapid initial growth up to about 4 feet high and a bit wider.

The golden currant lives up to its name with masses of fragrant yellow flowers, followed by yellowish currants of excellent flavor. It can be planted in mass or singly in the open where it assumes a graceful drooping stance about 4 feet high and 6 feet wide. The small birds seek its shelter all through the year, and towhees steal its fruits.

Unlike the first two, the chokecherry is very upright and will stretch to 8 or 10 feet tall if favored with soil or water, or even make a small tree of 4 inches or more diameter at the end of many years. It stands pruning, and if cut back, quickly sends up new shoots. It provides an excellent screen or hedge without trimming, in sun or shade. Although most of our birds make use of the chokecherry, it is the favorite of Evening and Black-headed Grosbeaks. They come for the berries long before they are ripe. Berries that survive to dark ripeness make fine jelly if they escape the thrush family, or the towhees. The chokecherry bloom clusters are very fragrant and attract butterflies.

Around stone walls and foundations, we plant the common native gooseberries, *Ribes inerme*. It has many virtues. It is the first shrub to leaf in the spring and one of the last to color and drop in the fall. In between, its deep shade shelters the House Wren and other small birds. The towhees love the sweet dark berries. Half bush and half vine, it can be trained both ways with delightful effects. Few weeds can compete with its early growth and deep shade. On poor soils it will relish some fertilizer and help cover barren spots. We constantly find new uses for this gooseberry.

There are three more shrubs that are hard to resist if one has the space, and they do not need very much. These three are the service berry, *Amelanchier alnifolia*; the ninebark, *Physocarpus monogynus*; and the waxflower, *Jamesia americana.*

In the wild, the serviceberry is often a ragged bush, perhaps because it is a favorite browse shrub for large and small mammals. But when given a chance, it grows upright into a small tree of graceful proportions.

Its cloud of white bloom comes early and is followed in the summer by soft, dark, sweet pulpy little fruits. The fruits make fine jelly and jam, and were often used in pemmican. The summer birds make quick work of these tasty fruits. The twigs have a very pleasing winter appearance. The serviceberry will grow at most elevations in sun or shade. Good soil and water produce rapid growth, as with most shrubs. It is a shrub you will enjoy if you have room after some of the foregoing list.

The ninebark, the second of these three, is a graceful shrub with spreading, thickly set foliage that has an attractive fall color. It requires a little less space than the golden currant, is perhaps a bit more showy in bloom with its mass of cream-colored umbels, but lacks the edible fruits. It makes a good choice to interspace with the golden currant and is a good foundation shrub. We have had a lazuli nesting in it, and it has the desirable style loved by the warblers. Its fall color lasts longer than the golden currant.



Jamesia

The waxflower, the third of the group, is in a class by itself. In growth, it needs about the same space as the golden currant, but has more attractive upright winter stance without losing a neat appearance about its base. The light colored twigs have a rustic appearance. In the spring, a mass of sweet-scented, cream-colored blooms attract a daylong swarm of insects. The numerous small leaves have a sculptured contour, and they turn a most attractive purplish red and hang on a long time in the fall. For the birds, the waxflower, or Jamesia as I prefer to call it, is another shrub offering thick cover at all seasons. Mixed with other shrubs, it adds a pleasant note of style to the garden, in either shade or partial sun.

Another shrub that can often be used is the threeleaf sumac, *Rhus trilobata*, although it has a very late leafing time in the spring, so that grass and weeds often come up before it is in leaf. This does offer an opportunity for bulbs around its edges. This shrub is aromatic, and some of the shrubs bear a scattering of scarlet drupes in late summer. Like other sumacs, it has fine coloring in the fall, but unlike other sumacs, it forms a

dense spread of branches and twigs about twice as wide as high and very attractive, in a rounded growth which in time reach 4 to 6 feet in height. It is very hardy, and will grow on hot, dry banks if given a start. Next to the hawthorn, it seems to have an especial attraction for birds. In banding, my nets set near *trilobata* have caught specimens of most of the smaller lower-level birds except the flycatchers, for which it is probably too dense. If *trilobata* is used, it is best to give it ample room, and while it is small, plant early flowering bulbs and perennials around its perimeter. But if you have the room, it will be a favorite with its steady stream of bird visitors. Perhaps the Rufous-sided Towhee will nest under it on the ground, if you live in its narrow, foothill nesting belt.

Lastly, there are two willows that should be mentioned. First there is the mountain willow, *Salix monticola*, common in the canyons. It likes water and if it gets water, it produces a splendid specimen plant when given ample room. It may grow as much as 10 to 15 feet in diameter both vertically and horizontally. When not crowded, it fills out at ground level to the full diameter. Almost all of the lower-level birds including the small flycatchers love this species and some of its similar relatives. I consider it the most attractive of the shrubby willows, and if you have space and moisture for it, you will enjoy many an exciting moment with its bird guests.

The other willow, the peach-leaf willow, *Salix amygdaloides*, develops into a medium-sized tree, usually with a number of trunks of rather equal size, but some times only one trunk develops. This is a stream-valley tree of the cottonwood belt. Like the box elder, it may become ragged in its mature years, but new growth springs up around the old. This is a tree of no special beauty, but apparently the birds, including the upper-level warblers, find it irresistible, as it has presented us with a number of rare finds such as the Black-and-white, Black-poll, Black-throated Blue, Parula, and Yellow-throated Warblers. Its foliage is thin, providing easy visibility.

There are many other species of shrubs and small trees, including the cultivated fruits, that are attractive to some species of birds, but my intention has been to list the native plants that have virtues for either birds or landscaping and usually both. These native plants are less demanding in their culture and most of them, once started, will manage by themselves with occasional pruning and watering. They won't die if neglected, and the birds will continue to appreciate their food and shelter.

Sometimes these species of plants are common and easily obtained locally. Occasionally, there is a nursery that can furnish most of them, as is the case with the Western Nursery, 14201 West 44th Ave., Golden, Colorado, 80401. This nursery has many other native plants. Most of the shrubs and trees that I have mentioned have considerable range in altitude. They are listed in Pesman's book, *Meet the Natives*, according to their natural habitat and will be found in more than one elevation range. All of them do best when not crowded; then they can fill out and be most productive for attracting birds. For the many families that have some acreage, these native plants offer many rewards in birds and landscaping.

Reprint courtesy – *Colorado Field Ornithology*

Ken Wright, Doug Sovern & Frank Barrett
of Wright-McLaughlin Engineers

IMPROVING URBAN MAN'S ENVIRONMENT THROUGH ENGINEERING



The role of an engineer is often that of transferring a concept into reality in an economical and lucid manner. He can accomplish this with a set of specifications and drawings to guide a contractor in the creation of the reality, inspecting the contractor's work to ensure that the original concept is preserved and that the intended high quality of the work is maintained. In short, the engineer takes an idea or concept and makes it work.

At Denver Botanic Gardens, the work of Wright-McLaughlin Engineers went beyond this. It included detailed explanations and word pictures to further convey the architect's intent and final objective to the craftsmen assigned to this project.

The concept and site layout were developed by the Gardens' landscape architectural firm, Eckbo, Dean, Austin, and Williams of San Francisco. Tim Downey, as an experienced and sensitive Project Architect, emphasized that maximum utilization of the 16 acre site could best be realized by creating a series of natural "rooms" featuring different forms, scale and botanic themes, connected by "corridors." Thus a viewer could experience several unique atmospheres within the available space.

The pools, lakes, waterfalls, pylons and fountains each serve as features in a particular "room," while the narrower chutes and channels, often paralleled by walkways, serve as "corridors."

Wright-McLaughlin provided the engineering planning, design, and construction supervision for the hydraulic (water-related) features such as the pylons, waterfalls, fountains, and channels, as well as the more mundane and almost invisible systems – the irrigation lines, water recycling pump system, sub-surface drains and storm drainage facilities. In addition, other firms assisting as subcontractors on specialty services were: Hornbein and White, architects; Jorgensen and Hendrickson, Inc., structural engineers; Rice-Marek-Harral & Associates, electrical engineers; and Chen & Associates, Inc., soils engineers.

For the engineers in Wright-McLaughlin, this was a chance to help create something stimulating, both aesthetically and technically. The waterfalls and chute in particular are both visually and audially exciting as well as being unique outside an engineering laboratory. The water begins its journey atop the 15 foot pylons in the upper lake, continuing over a semi-circular waterfall especially designed to accentuate the sound of tumbling water, through a cobblestone sided channel to a second waterfall accentuated by standing waves. The flow is then accelerated along a narrow, shallow chute and lifted by a flipbucket (sort of a concrete ski-jump) to splash onto blocks at the upstream end of the lower lake. Near the stepping stones, water races over a 7 foot high waterfall, thundering into a rocky pool before meandering through the Japanese Gardens in a natural channel. After it arrives at the Gates Pool, the end of its visual journey, water flows to the pumphouse, almost hidden at the west end of the site, where it is lifted back up to the pylons at the rate of a 1000 gallons per minute.

While in operation, the decorative waterways contain 600,000 gallons of water, supplied via two buried meter vaults from City of Denver mains. A daily 3% replenishment with fresh water was planned to prevent excessive algae growth with minimum power and water waste. Year-round operation is provided-for with minimum maintenance.

The hidden portions of the project are equally as important as those we can see.

For instance, the 9000 feet of irrigation lines can distribute water throughout the gardens in patterns to accomodate various plant requirements, while a separate 2100 foot potable water system will satisfy thirsty visitors. Sub-surface drainage from beneath the waterways and critical planting areas is directed to the storm drainage system, having 3900 feet of underground piping with site grading integrating the landscape architect's design. This system actually retains some storm water runoff during storms, allowing discharge rates to be kept lower than normal to prevent overloading downstream while providing for natural irrigation and improvement of the quality of the water eventually discharged.

Construction, begun in October 1970 by Langfur Construction Corporation, was completed in August, 1971 at a total cost of $280,000; the waterways are expected to be operated continually upon completion of the sidewalks currently being installed. Final landscaping will be accomplished in the future.

As engineers, this project has been for us a memorable opportunity to use our abilities in service to both man and nature. The entire project is an effort to improve the social and physical environment of urban dwellers. As our contribution to the expansion moved towards reality, we've enjoyed working with Eckbo, Dean, Austin & Williams and with the Denver Botanic Gardens Directors and staff; now we too, must wait until nature provides the final touch.

Editor's Note: The Wright-McLaughlin Engineers design for the Denver Botanic Gardens has won the first place award in the Engineer's Excellence Contest sponsored by the Consulting Engineer's Council of Colorado.

CHARLOTTE A. BARBOUR August 10, 1891 to December 29, 1971

Charlotte A. Barbour, born Charlotte A. Berger, daughter of Charles Bart Berger and the granddaughter of Senator and Mrs. Nathaniel P. Hill, spent her early years in Denver. Her father died before she was born. Summers were spent with her Grandmother Berger at Estabrook. Later in life after she had returned from the East, she built a small cabin on some of the Estabrook land, showing her love for the area that had afforded her so much pleasure in childhood.

Charlotte completed her undergraduate work in Paris and later received a degree in journalism from Columbia University. She was a literary agent in New York City.

She was married to Alexander L. Barbour in 1917 and they divided their time between New York City and a farm in Lisbon, New Hampshire. When the snow was deep, they would spend time in Concord. Being an energetic person, Charlotte took courses at the University in Forestry, did research and wrote articles for various magazines in New England.

After the death of Mr. Barbour in 1945, she returned to Denver and put her energies to use here. During the years that followed, she belonged to a number of organizations and was a member of the board of several. Two of these were Denver Botanic Gardens and Denver Dumb Friends League and to these in particular she devoted much time and energy.

Mrs. Barbour was City Forester for a time with Earl Sinnamon as assistant. Then reversing positions, she devoted her time to Publicity and Junior Education. Her car often contained an assortment of tree branches and other horticultural specimens.

In connection with their work in the Forestry office, Mrs. Barbour and Mr. Sinnamon did the text for a pamphlet published by the city with illustrations by M. Walter Pesman, called *What Tree Is This?* The booklet was not reprinted by the city and in 1965 Denver Botanic Gardens received permission for a new printing. It is sold only at Botanic Gardens Gift Shop. Any proceeds are turned over to the Helen A. Fowler Library.

By 1948 *The Green Thumb* listed Mrs. A. L. Barbour on the Publications and Publicity Committee for the then called "Colorado Forestry and Horticulture Association." One issue that year has an article *Orchids to Mrs. Charlotte A. Barbour.* It commends the work done on the magazine and mentions particularly soliciting for advertising. This interest continued through the years and she was on the editorial staff and contributed much to the magazine.

In 1949, Mrs. Barbour was elected to the Board of Directors and was listed as Secretary as well as on some committees. She was a member of the Board continuously until her death and always active on several committees until ill health made it impossible.

After the death of Mrs. Helen Fowler in 1960 and the removal of the organization to the house at 909 York Street, the library needed help and Charlotte adopted it for her special interest. She made it possible to have a part time professional librarian in the person of Mrs. Hellriegel. Aided by a retired librarian, Miss Lucy Crissey, and willing volunteers, the library was restored to order. Among the special things done for the library were: supplying funds for materials to mount the Emma Armstrong Ervin watercolors in albums; having a case made for rare books; setting up a monthly payment for books; depositing money with the Trustees for moving the library to the new building.

Several years ago, Botanic Gardens Library was given quite a number of books from Mrs. Barbour's personal library. Since her death, Mrs. Prentiss Andrews, her daughter, has donated the remaining books that could be used in the Library.

Mrs. Barbour has been missed these last years when she could no longer be active. However, she showed great pleasure when callers could tell her about affairs of the Gardens, so her interest never waned.

M.L.S.

These are the things I prize,
And hold of dearest worth;
Light of the sapphire skies,
Peace of the silent hills,
Shelter of the forest,
Comforts of the grass,
Music of birds, murmur of little rills,
Shadows of clouds, that swiftly pass,
And after showers the smell of flowers
And of good brown earth,
And best of all along the way
Friendship and mirth.

———Henry Van Dyke

A Delicate Beauty

Carol L. Radetsky

The majesty and vastness of the Colorado Rockies always overwhelms me with their beauty and massive size; yet their gentleness and invitation to warmth and perennial growth is everlasting. Size seems incongruous to the mountains; this is a land of dramatic contrast producing large conifer trees and tiny alpine flowers. The vastness of the forest is sovereign as it watches over the miniature world below. The ladys slipper is part of this world, my world.

For Thoreau there was Walden. For me there is also Walden and my speck of the world above Evergreen. Seldom does a week go by when I don't make the opportunity to relish the miracles on this particular land. There are quaking aspen trees, numerous conifers, wild roses, daisies, fantastic lichen and juniper berries. Even the decaying tree stumps have their special beauty. The birds are plentiful and the chipmunks scamper around claiming their own territory. When you look up you can revel in soft white cumulus and cirrus clouds weaving their way through the sky.

Two years ago while enjoying a walk I almost literally stumbled over the remarkable ladys slipper. My immediate reaction was surprise and wonderment: "Wow, that's beautiful, what is it?!" It was gorgeous and I remember smiling and thinking – it looks like an orchid but orchids grow wild only in Hawaii! Initially it was identified through word of mouth by a friend. I waited an entire year to get a look at my discovery again. This year joyfully, I took a roll of film and smiled with each snap of my camera. How fortunate I am for God to share this exquisite beauty with me. As there were no other slippers in the area I went strolling on.

The beautiful bright yellow slipper is formed by one of three petals. The other two petals extend almost vertically to it taking on a brownish color and becoming twisted as they extend. The slipper itself is sac-like shaped with magenta colored streaks running throughout its base; it is about 2-3 inches long. A member of the *Orchidaceae* family, the herbaceous plant is about 10 inches high. The leaves look like spears taking on a ovate-lanceolate shape and are approximately 8 inches long. Sheathing tapers to a slender point at the base of the plant in an acuminate manner. The twisted petals unite at the apex of the stem.

About 30 species belonging to the genus *Cypripedium* have been discovered. The rare, *C. calceolus* L., yellow ladys slipper is almost extinct in Colorado. My special slipper was growing with a large quartz crystal as its shelter and it was nestled among the kinnikinick; its vibrant yellow color complimenting the sun. It stood proudly and with exquisite beauty. I discovered these ladys slippers above Evergreen in Clear Creek County. The altitude there is 8300 feet into the montane zone between the subalpine and foothill zones of the life zones. The slippers shared their habitat with kinnikinick (*Arctostaphylos uva-ursi*, L. Spreng) and the golden banner (*Thermopsis divaricarpa*, A. Nels.). Growing on the south side of the mountain the *C. calceolus* was found the last week of June and the first two weeks of July. In 1971, the climate was relatively dry. The recorded precipitation was only .02 inch during this time. Temperature ranged from 36-88°F. The soil pH is surmised to be acid because of the abundance of conifer trees and kinnikinick in the general area.

The world is filled with exciting and provocative stimuli to enjoy. We are increasingly aware of our environment and the minimal effort it takes to interrupt its delicate homeostatic balance. I feel it is our responsibility as curious and nature seeking people to cultivate an enjoyment of our environment and to protect its sensitive balance. We too, are part of this dynamic equilibrium. In so doing more people will be able to enjoy the ladys slipper as well as other plants and animals nearing extinction.

Exotics of COLORADO

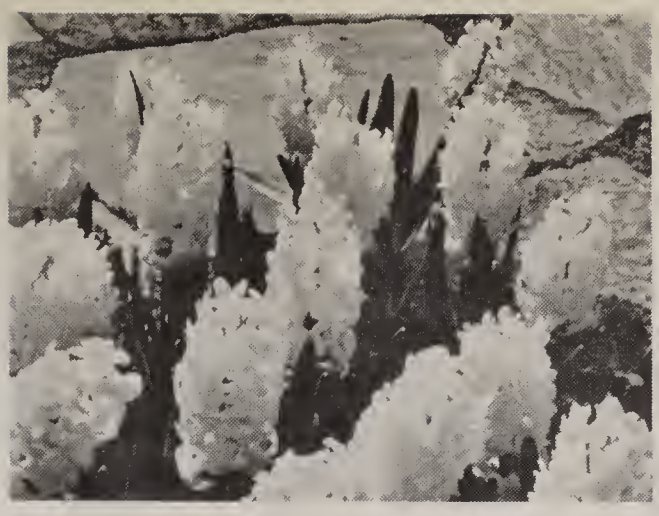
Hyacinth, *Hyacinthus orientalis*

Helen Marsh Zeiner

Hyacinths are such a familiar part of spring that we accept and enjoy them without giving a thought to how we came to have them.

Our common hyacinths are hybrids and horticultural varieties of *Hyacinthus orientalis* L., found growing wild from Greece to Syria and Asia Minor. Present day hyacinths are quite different from their Eurasian ancestors. *Hyacinthus orientalis* is slender and graceful in contrast to its twentieth century descendants which are rather formal flowers with stout stalks and large blooms borne in heavy, straight spikes.

Some gardeners feel that hyacinths are too stiff and formal for many gardens – they have even been called "obese" and "overstuffed." Hyacinths are a part of the garden scene for such a short time, however, that most gardeners do not mind the formal appearance. Whether or not we find the habit of growth pleasing, we can all enjoy the colorful and fragrant blossoms. In any case, hyacinths tend, if they become naturalized in a garden, to revert to a more slender and graceful habit of growth.



Hyacinths are one of the best bulbs for forcing for the indoor garden. Here the stiff habit of growth is no disadvantage.

Hyacinths were cultivated by the ancient Greeks, whose selection, whether intentional or not, improved the strain. These early gardeners simply chose and preserved the hyacinths that appealed to them most, and thus they perpetuated desirable varieties. Hyacinths were introduced from Constantinople to Renaissance Europe in 1560. Their beauty and sweet scent made them immediate favorites and they became prime material for hyacinth fanciers to develop and improve. Much of the modern bulb selection and breeding has been done in Holland, and the bulbs are sold as Dutch hybrids.

The original wild hyacinth is believed to have been a light blue-lavender. By the sixteenth century, writers were describing hyacinths in blue, pink, and white and in both single and double forms. Today, there are many shades from pure white to cream or yellow; palest pink to deep rose-red; and light blue to purple.

Hyacinths are members of the lily family, *Liliaceae*. They are sometimes described as "bunch-flowered lilies." Examination of the 6-segmented flower clearly shows the relationship to the lilies. There are about 30 species of hyacinths known, all native to the Mediterranean region, but only *Hyacinthus orientalis* is widely cultivated.

Hyacinthus is the ancient Greek name for this plant. As with many plants of such ancient origin, the hyacinth played a part in mythology. It is said that Hyacinthus was a handsome Greek boy. Zephyrus, god of the winds, and Apollo, the sun god, both loved Hyacinthus. The boy, however, preferred Apollo and plainly showed his preference, making Zephyrus extremely jealous. When Apollo challenged Hyacinthus to a game of quoits (in which a discus is pitched at a fixed target), Zephyrus hid in the nearby woods, watching and plotting revenge. When Apollo hurled his discus, Zephyrus deflected it so that it struck Hyacinthus in the forehead and instantly killed him. The grieving Apollo declared that the beauty of Hyacinthus should not be lost, but should be preserved in the beauty of a flower. He then summoned the hyacinth out of the earth in remembrance of his young friend. Thus the hyacinth came to signify remembrance, and it has been sculptured on tombs and headstones for this reason.

It is also said that Venus, to make herself more beautiful, bathed in the dew formed on hyacinths; and that the beds of Jove and Hera and Adam and Eve were made of hyacinths.

Helen D. Stanley

VIVARIUMS



Small living creatures whose ancestors roamed the world millions of years ago can make their home happily in a glass garden. Tiny critters such as turtles, lizards, salamanders, worms, snails, frogs and chameleons thrive in this environment. They make a terrarium a living thing and offer an opportunity for a nature study both of plants and animals, especially for children. For shut-ins or apartment bound people, a vivarium is a pleasant thing to have around. It is fun to make and to observe and as a group project for children, there is nothing more exciting.

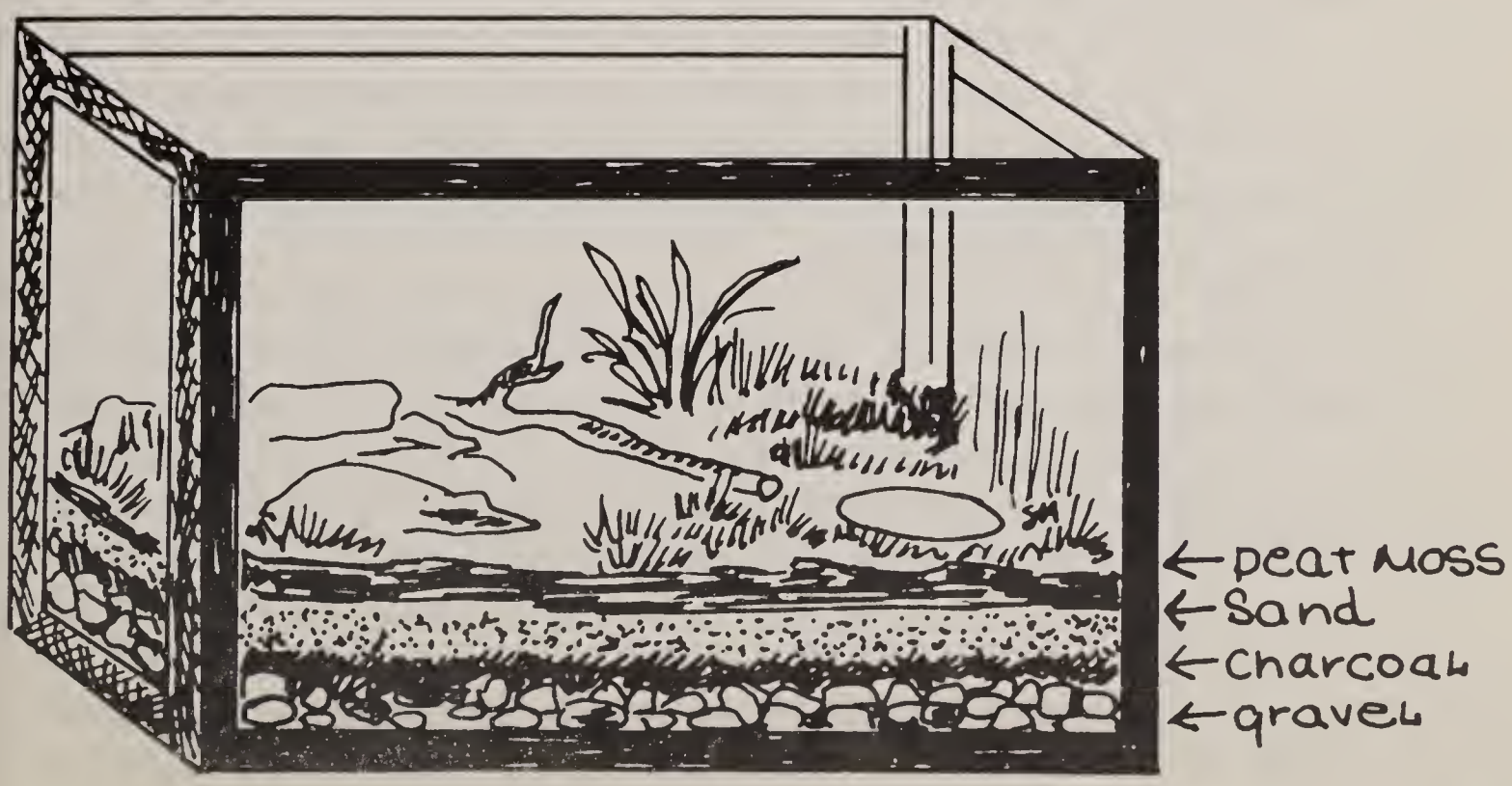
A fish aquarium is the best container for a vivarium although others can be used. The larger the better so the creatures will have room to wander. Lizards and animals of this type live better in a desert type landscape and others in a humid atmosphere. It is best to study each applicant for tenancy and find out what it likes best in the way of climate, food and water. It is thoughtful to have two of a kind in your garden so they won't get lonesome. Brochures may be purchased in pet shops on various small pets or books may be found in your library.

Prepare your container as you would a terrarium, with sterilized soil and small gravel on the bottom. Place the gravel in a sieve and pour boiling water over it and allow to dry. Next comes a layer of charcoal over the gravel with a layer of clean fine sand and over this, your soil mixture composed of a third each of peat moss, loam and sand, 3 or 4 inches in depth. The landscape should be uneven with hills and valleys and the plants in varying heights, types and colors. (The same plants mentioned in an article entitled "Bottle Gardens" in the Winter Issue of *The Green Thumb,* 1971, are excellent for a humid vivarium.) For a desert garden use the same base with more sand added to the soil and the top covered with the sand. Use small cactus for the plants. Beautiful rocks placed around add much to the decor of any garden and give the pets a place to hide.

Turtles need supplemental feeding such as lettuce and watercress. Chameleons enjoy drops of honey, bits of bananas and grains of sugar placed on a leaf. They can go for days without feeding. Turtles, frogs and snails and such like a tiny dish of clean water embedded in the soil to drink and cavort in. The health of the animals is the responsibility of the landlord and it is necessary to study their habits and needs before attempting to make a vivarium. A cover of some sort should be added to the container, either wire mesh or a glass top, allowing some air to circulate.

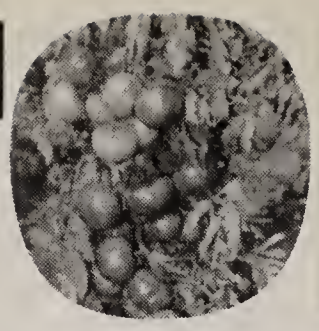
The summer of 1970 will well be remembered by those who participated in the Children's Gardens for a class on how to make vivariums. It was held in July and the children were told to bring the critters. There was an embarrassment of riches and the garage took on the appearance of a weird pet emporium, alive and jumping with tiny things that either crawled or swam. The animals were displayed for inspection and two gardens were made so the children could see how it was done. There were frogs, snakes, snails, turtles, worms, lizards and a Texas horned toad whose appearance had not changed much in a million years. The frogs were the jumping variety and "did their thing" by leaping in all different directions, trying no doubt to find their way back to Cherry Creek where the kids had found them. Little boys and girls were down on the floor of the garage on their hands and knees scooping them up and returning them to their containers.

The vivarium with two tiny turtles as occupants was the most popular and later was displayed in the summer house of the Children's Gardens for the remainder of the season with the children caring for it. A contest was held to name the animals and the two turtles won by a large majority. They were named Bonnie and Clyde. Ten prizes were given in the contest and the names submitted were charming and imaginative as well as funny.



Norman LeMay

TRYING TOMA



For the past 35 years I've been engaged in the growing of vegetables; the last 20 years have been here in Denver. My overall plan has always been the same: to select 2 or more varieties of a given vegetable and grow them together for comparison. Tomatoes have been my favorite.

I've entitled this article "trying" instead of "testing" because no actual measuring of plants, weighing of individual fruits, or of combined fruits per plants per year, was done. What I did do was study many catalogues, buy seeds from many sources, then grow from 1 to one-half dozen plants of each variety, and from 1 to 35 varieties per summer. Since I haven't the space or time to try every variety I see pictured and described in the seed catalogues, I choose carefully.

In picking tomatoes to try, I've stayed away from the commercial varieties with reputed good shipping qualities; this generally means a hard, tough tomato. When breeders of commercial varieties are developing new ones they use "drop tests" to determine whether a new variety or strain will ship well. Drop tests are carefully controlled experiments where tomatoes from certain plants, of the same degree of ripeness, are dropped from a definite point onto concrete. If they don't break, they are considered to be shippable.

However most home gardeners want tomatoes that taste good. The gardener should try a number of varieties (or ask many questions over the back fence), study seed catalogues, and sift through information to get that certain quality in flavor and texture, that balance of acid and sugar, that makes for a great tomato taste.

I have decided from my experience that garden varieties are improving for the production per plant is going up and the disease resistance is also up. However, certain ones seem to have changed over the years. Rutgers seems to be getting smoother and better looking but smaller. Earliana seems to be getting rougher and smaller. Ponderosa seems to be getting much smaller. Still memory can play tricks and many factors like soil and weather can enter in.

Often the initials V. or V.F. or V.F.N. are listed after the names in the American seed catalogues. This means that the variety has a measure of resistance, called triple resistance to one or all of the main enemies of tomatoes, verticellium, fusarium wilt and nematode. The nematodes are microscopic worms generally found in warmer climates. Look for these varieties for preventing disease is better than trying to stop it after plants start dying.

To start plants of a particular variety, say F-1 Terrific V.F.N. and F-1 Burpee V.F. look in the classified ads in the newspaper at planting time to find the growers then call them to see if they have started the

TOES IN A HOME GARDEN

variety you want. Never buy plants that don't carry a variety name. Because of the short growing season in Denver we need early varieties. Tomato breeders are continuing to develop plants which mature early and have good eating quality. The varieties listed below are quite new and I think they are great.

F-1 Spring Giant
F-1 Small Fry
Fire Ball
F-1 Spring Set V.F.
F-1 Burpee Big Early
F-1 Red Boy
F-1 Sun Up

(However, the late varieties have the better taste and if anyone wants to gamble on the weather, he should try some of them.)

I'm certain in my own mind that you could save a few seeds from a tomato that you thought was a good one, start them in your own house in a south window 6 weeks before Memorial Day and end up with a better crop than if you just bought a box marked "tomatoes." However I don't recommend it. Pick a good variety of seed from a catalog (not from seed packets in super markets or nurseries. Although their seed is fresh, you're limited to just a few old varieties). Start them 6 weeks before Memorial Day, then transplant them outside on Memorial Day. An easier way of course, is to buy from a grower. Good plants started in a green house in 2" or 3" peat pots will cost about $2.00 or $3.00 per dozen. Be sure the plants look strong and have a dark green color. The very expensive plants that are grown in a large container probably won't gain you a thing because the smaller plants will catch up.

Put the new plants out as soon as you get them home. Pick a place in the garden where they will get the most sunlight possible and plant them in good rich soil with good drainage. Spacing will depend on the variety and on whether you want to stake to a single stem, to 2 or 3 stems or let them spread on the ground. There are advantages to each of these methods of growing tomatoes. The largest tomatoes are grown when you stake to a single stem. However, you need to buy 2 or 3 times as many plants for a given area if you stake singly. Staking is more work. Total production by total weight is only slightly increased by staking but the fruit is cleaner, bigger and looks better.

Watering tomatoes can be a big problem in Denver. My first serious attempt at tomato trials was on sandy Cherry Creek bottom land. I got in the habit of watering heavily and had good luck with tomatoes. Next

I gardened a few years on rich heavy clay in West Denver. Here I had trouble adjusting to less frequent watering. Now I'm gardening on the rich sandy loam of Platte River bottom land. I had success in sand and sandy loam but I believe if I'd known how to water on clay I could have grown my best tomatoes there.

TO SUM UP: Pick varieties from seed catalogs or growers that have a reputation for being good; lean towards the F-1 or V.F. varieties; choose early varieties to counter our short season; transplant around Memorial Day; give all sun possible; mulch; water deep about once a week on sand or sandy loam and about every ten days to two weeks on clay.

ANNOTATIONS

Sutton, S. B. *Charles Sprague Sargent and the Arnold Arboretum.* Cambridge, Harvard University Press. 1970. $10.00

Arnold Arboretum is celebrating its 100th anniversary this year. Mrs. Sutton's book is a tribute to the people who were most closely associated with the institution. Two men devoted their careers to the development of Arnold Arboretum: Charles Sprague Sargent whose botanical research field encompassed North America, and Ernest H. Wilson of whom Alfred Rehder in 1930 said: "He succeeded in collecting and introducing into cultivation a greater number of plants than any other collector." There are many familiar names to be met in this history – Gray, Bailey, Rehder, Faxon, Hooker, Olmsted. Mrs. Sutton draws the parallel between the development of Arnold Arboretum and the advancement of botanical research in the U.S. This well researched book is entertaining reading.

The Helen Fowler Library has been acquiring the *Time-Life Encyclopedia of Gardening.* There are 6 volumes: *Landscape Gardening, Roses, Annuals, Flowering House Plants, Lawns and Ground Covers,* and *Evergreens.* The illustrations are beautiful and numerous. There are also good indexes and charts denoting particular local requirements. One can note in the acknowledgements in the *Annuals* volume that Dr. Hildreth served as regional consultant.

The complete set of the *Audubon Nature Encyclopedia* has been received. This is in the juvenile reference collection but can certainly be used by anyone desiring basic information. Each entry begins with common names, followed by the scientific name and the family. The range and habitat, description of leaf, bark, flower and fruit complete the text on a particular plant. Each article has a bibliography of recommended reading. The illustrations are numerous and many are in color but they are not of the superior quality of the *Time-Life Encyclopedia.* The volumes are sturdily bound and should provide good reference material for all our patrons.

S.H.

approaches to INSECT CONTROL

J. W. Brewer

Prior to the discovery of chemical pesticides man waged a constant, and frequently unsuccessful, battle against his insect enemies. Except for picking off the offending insects there was little early man could do to protect his plants. Perhaps early commercial approaches to control were based on magic, encantations, or witchcraft. If so, these methods were probably of little benefit except to the witch doctor who may have received some fee for his services. Sometime later, in the Asiatic countries, it was discovered that *Pyrethrum* flowers had insecticidal properties. Powder made from these flowers killed insects, and was not toxic to man, so it could be used against human lice. The powder was very expensive, supposedly equal in value to gold on an ounce for ounce basis. Obviously, then, this material was too expensive for control of plant insects. What could the farmers of the day do to protect their plants? Probably not much in the way of direct insect control. However, we find that many cultural practices adhered to because of tradition, actually do much to decrease insect problems.

Chemical control began on a practical basis with the use of arsenicals, like Paris green, but it wasn't until the early 1940's when DDT was discovered that this approach really came into its own. DDT was so effective, inexpensive and long lasting that it seemed insect control problems had been solved. Later, other chemicals supplemented DDT and in many situations non-chemical approaches to insect control were dropped. Some workers began to feel chemicals were the complete solution to insect pest problems. Recently, however, researchers have become increasingly aware of the possibilities that some pesticides and their residues may cause damage to our environment. The possibilities of such damage have encouraged many workers to reevaluate insect problems and to consider non-chemical control methods in an attempt to reduce pesticide contamination of the environment.

What are the means by which such contamination can be reduced? I think one reasonable answer will be a reduction in the amounts of persis-

tent, toxic pesticides used and, where chemicals are necessary, the substitution of safer, non-persistent materials. There are various ways of doing this. Let's look at some of them.

SOLUTION #1 - Legislative action banning use of selected, or all, pesticides.

You are perhaps aware of Colorado Senate Bill 27 introduced last year which was to prohibit the sale, use, and manufacture of organochlorine pesticides. Therefore, you may realize that this solution is more than just a possibility. Senate Bill 27 was withdrawn, but I am sure we can expect more of the same and eventually something of this nature will be passed. Workers in the insecticide industry feel certain that such legislation will be enacted. They also think that DDT and related organochlorine pesticides will be the first of a long line of prohibited materials. Needless to say, this industry is interested in other approaches to pest control as well as in less persistent and less toxic chemicals.

National legislation is currently being considered (Senate Bill 1021) that would essentially require classification of all pesticides into use categories. Only pesticides placed in a general use category could be applied by the home owner. This category will probably include Malathion, Diazinon, Pyrethrins, etc. To apply other materials in the restricted use category will most likely require a license. This does not mean though that householders, farmers and gardeners, cannot get a license. This bill has been recently approved by the appropriate Senate committee and probably will be approved by both houses.

SOLUTION #2 - Restrict the uses of pesticides to the so-called essential uses (agricultural crop protection and disease control). What areas may not be considered essential? Protection of ornamental plants and shrubs seems a good guess to me, especially in metropolitan areas. Why?

First of all, the major contributors of pesticides into the environment are not farm areas as you might expect, but rather large, metropolitan areas. The evidence is such that there is little doubt that cities are putting great quantities of pesticides into the environment. Why is this so?

The farmer generally operates on a relatively small margin of profit. If 4 ounces of an insecticide will give control of a pest, he cannot afford to put on 5 ounces. He is careful on a per acre basis because of the large acreages and cost involved. Home owners, on the other hand, are not putting material on large acreages, but generally speaking they do put on greater quantities on a per acre basis. The cost of the material is not an important factor to the home owner because of the small "acreages" involved. Other contributors to the metropolitan problem are the spray applicators who come into a yard on a routine basis and spray all plants whether infested or not. Certainly, unnecessary spraying on a large scale is a great factor in environmental contamination. On the other hand, if the spray applicators came into your yard, found no reason to spray (no insects) and left without unrolling the hose, they wouldn't get 50 feet down the street before their phone would be ringing. Even if they take the time to explain to the customer that spraying isn't necessary, they

have problems because the customer then wants a reduction in his bill. This then becomes a problem of public relations. I think the only answer is to reeducate the customer to the fact that spray applicators are selling a service, pest control and not spray material. The customer has to learn that spraying when no pests are present may be more of a problem than the pest itself.

A second reason for restricting use of pesticides in urban areas is that fairly good arguments can be made for the needs of pesticides on agricultural crops and disease control. The expanding world population certainly needs an ever increasing amount of food and the loss of agricultural chemicals would seriously reduce our food production capabilities. Pesticides are also an important weapon against disease carrying insects in many countries. Certainly the decrease in deaths due to malaria is direct evidence for the value of chemical control. It is much more difficult, however, to demonstrate the need for absolute insect control for landscape plants. Certainly the aesthetic value of a plant is impaired by insect damage, and this is important to the homeowner. However, there is considerable doubt in my mind as to whether or not the aesthetic value of a perfect plant justifies the quantities of pesticides used in urban areas. I believe that uses of pesticides in landscape situations will be the first area to be seriously restricted and that we must consider other control methods to protect these plants.

SOLUTION #3 - Use of other approaches to insect control.

As I have suggested above, the very first approach to insect control was probably to pick the offending bug off the plant. We call this the mechanical method of control and in its place it is very effective. It is most practical on the home owner level (that is for the home owner to do it) especially where only a few plants are involved. Mechanical control can be very effective. For example, the only good control for a pinyon pine borer, that I know of, is purely mechanical. It is necessary to dig the insect out of its burrow in the tree trunk with a knife. This is slow, and tedious, but effective. Webworms and tent caterpillars can also be controlled by simple removal: in fact, chemical control may be difficult because of the protective web. Control of the spruce gall aphid may be obtained by removing the new galls in the spring. Removing old galls also improves appearance of the tree but has no effect on the insects, which by then have gone. Light spittlebug infestations on ornamentals can generally be controlled with pruning shears. Mite and aphid populations can frequently be reduced by hosing the plants down with water. Trimming off dead or infested branches is still another effective mechanical control method. I think you will agree that some insect problems can be controlled, or at least reduced, by the home owner using the mechanical approach.

Another basic approach to pest management is called cultural control. This includes any practice that maintains plant health and thus reduces insect attack indirectly. The best prevention against attack by borers and bark beetles is to keep the plants in a healthy condition. As a general rule these pests attack only declining or dead trees. Proper spacing of plants

to reduce dense shading and humidity will do much to reduce slug problems. Cultivation under trees and shrubs in the fall will reduce the number of overwintering insects to a great extent. Just removing plant debris during winter will reduce overwintering sites of insects and will lower pest populations.

The use of insect resistant plants is another important cultural means of controlling insects. There are insect resistant varieties of several ornamental plants and it is useful to consider these when selecting plants. An example is the various varieties of honey locust. Insect resistance ranges from the very susceptible Sunburst variety to the resistant Morraine.

One of the most popular approaches to insect control, other than chemical, is biological. Biological control may be nothing more than the encouragement of naturally occurring control organisms (enemies) of the pest. If we are going to rely on biological control organisms, however, we will have to re-orient our thinking somewhat regarding the necessary level of control. Naturally occurring biological control methods cannot result in complete or absolute control because of the basic nature of the control mechanism. You can see that a successful, naturally occurring parasite or predator cannot afford to be too devastating because if so, it will completely destroy its food source. Therefore, biological control organisms cannot be too effective at their job, for the sake of their own survival. In most cases, a delicate balance has evolved between the host and predator (or parasite) such that both can exist in nature at the same time. Of course, when a pest (host) population becomes large, the predator (or parasite) may become very destructive and destroy 90-95% of the pest population but it will not completely eliminate it. On the other hand, control agents introduced from other countries, or areas, may be better control agents because they usually have not evolved the delicate relationships of the naturally occurring predators. Frequently, the introduction of a foreign predator will result in complete control of the pest organism. The predator then dies, of course, for lack of food. The problem here is that you have to keep reintroducing your biological control agent. You cannot establish it in most cases, and expect it to maintain itself because it does too good a job. It destroys its own environment (which may sound familiar).



Wasp

A successful example of biological control is the Vedalia lady bird beetle introduced from Australia. This insect gives excellent control of cottony cushion scale in the citrus growing regions of California. Once introduced, the beetle maintained itself and did not have to be reintroduced, at least until the advent of chemical control.

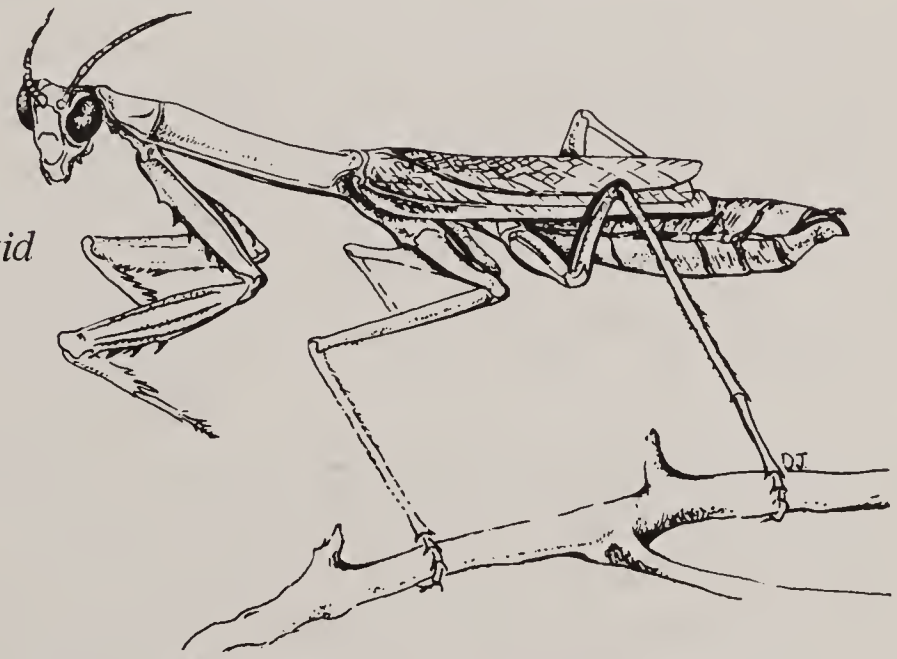
Biological control organisms fall into three large groups. These are: predators, parasites and pathogens.

Predators capture and eat smaller, weaker, or less intelligent insects, often at a very high rate. They generally feed on a variety of insects and so may be effective against a wide variety of plant pests. Some common predators include the following:

Lady Bird Beetles. Both the adults and larvae feed on aphids, scales, mealy bugs, and insect eggs. They may be purchased in large quantities from several California firms. However, the beetles may disperse rapidly upon being released and may not be as effective as we might hope.

Syrphid Flies or Hover Flies. These insects are predaceous only in the larval stage. The adults feed only on nectar and probably do some pollinating. Many aphid colonies will contain one or several of these slug-like, tan or green maggots. The maggots grab the aphids with their mouth hooks, raise them in the air and suck out the body juices. Each larva will eat one aphid per minute for long periods of time. The adults lay the small white eggs in colonies of aphids, usually only one per colony.

Lacewings. Because of their feeding habits, lacewing larvae are frequently called aphid lions. The adults are generally not predaceous but the larvae feed on most soft bodied insects. They are so predaceous that they may even eat each other. Apparently to prevent this the eggs are laid on stalks so the first to hatch doesn't eat the other eggs. Lacewings (pupae) are commercially available.



Mantid

Praying Mantids. Mantids are large insects with grasping front legs. Those legs are used to capture prey and hold it while it is being eaten. Although these insects are beneficial they probably are not as valuable as some of those mentioned above. Mantid egg cases may be purchased from various biological supply houses.

Parasites feed on insects also — as do predators, but frequently live inside the host as an internal parasite. Parasites are probably more effec-

tive at reducing populations of pest insects than predators. However, most parasites have a narrow host range so their effectiveness is restricted to one or at most a few pest species.

A part of my research program involves a needle gall on pinyon. This deformation is produced by a mosquito-like insect called a midge. This midge is controlled, in part, by a small wasp parasite, which develops inside the midge and kills it. If we could develop means of encouraging the parasite populations, chemical control measures might not be necessary.

The elm leaf beetle has been the object of interest in several biological control studies. A wasp parasite has now been established in California and is apparently maintaining itself. This same parasite has not survived, for some reason, in the eastern United States. A second parasite of the beetle, a Tachinid fly, has also been established in California. Although occasional defoliation still occurs in that area, the injury is not as general, or destructive, as occurred prior to parasite introduction.

Attempts have also been made to establish parasites of European elm scale and the smaller European elm bark beetle. Both have been only moderately successful thus far.

Pathogens. Insect pathogens (diseases) offer another promising means of biological control. A few insect pathogens have been developed commercially and some are presently being considered for registration. Pathogens are extremely susceptible to environmental conditions, however, and the level of control obtained varies a great deal.

Insect diseases may be caused by bacteria, fungi, or viruses. One bacterial species has been used successfully for control of the Japanese beetle in the eastern United States. Other species of bacteria have also been used against various insect pests. Several fungi, including red, brown and yellow species are said to give some control of white flies attacking Florida citrus crops. Unfortunately, most fungal pathogens require high humidity levels and so may not be very valuable here in Colorado. One type of virus has been used commercially to control the alfalfa caterpillar and other types are being tested against several insect pests.

Generally speaking, insect pathogens are quite specific in regard to the insects they will attack. Therefore, it becomes necessary to know the pest you are trying to control, otherwise your efforts may not be effective. Many failures of biological control agents are a result of attempts to control insects that are not hosts for the controlling agent.

The last type of control I want to mention – integrated control, isn't really a control method at all. Integrated control is merely the combination of two or more of the methods previously discussed, including the use of chemicals, so that specific insect problems are attacked in the most scientific way. If we keep these other control measures in mind, and apply them whenever possible, we can drastically reduce the amount of chemicals used without a great decrease in the level of insect control obtained. I felt, therefore, that the homeowner can make a substantial contribution to the reduction of chemical contamination of our environment.



FOCUS on DATURA ARBOREA

IN THE BOETTCHER CONSERVATORY

Peg Hayward

Considerable confusion in nomenclature is evident concerning the genus *Datura*. This confusion dates back several hundred years and no taxonomist has attempted to clarify the contradictory descriptions of the various species for the layman. Nevertheless, the plant in the Boettcher Conservatory collection labeled *Datura arborea* L. attracts considerable attention when almost covered with pearly-white, trumpet-shaped flowers hanging like bells.

Datura arborea, angels trumpet, is a native of Peru. It is a member of the nightshade family, *Solanaceae*, which ranks high on the list of plant families that serve mankind. This family of dicot plants provides food plants including potato, tomato, and eggplant; poisonous and medicinal like deadly nightshade, henbane, and Jimson weed; several cherished ornamentals such as the petunia; and the notorious "weed" tobacco. The scientific name of the family is derived from the name of one of its genera, *Solanum*, which comes from the Latin word *solamen*, meaning quieting, alluding to the sedative properties of some of the species. Many members of the family produce alkaloids, which have a quieting effect, sometimes a permanent one. Possibly this is the answer to why the family is commonly known as the nightshade family.

Datura, a genus of contrasts from smelly weeds to lovely ornamentals, consists of 15 or more species of annual or perennial herbs, shrubs or trees. The generic name comes from the Hindu *dhatura* or *dhattura. Dhat* is the name of the poison derived from the plant, and the *Dhatureas* were a gang of thugs who used the plant to stupefy or poison their intended victims. Linnaeus, who adopted the name *Datura*, felt that he should not use a barbaric name for a plant unless he could find a Latin root for the word. He came up with *dare*, to give, because *Datura* is given to those whose sexual powers are weakened.

Datura arborea is tree like as implied by the species name. It may grow to a height of 15 feet and it has a stiff irregular branching habit. The grayish-green leaves are 8 inches long, ovate-lanceolate, with entire margin. The leaves are borne in pairs, one a third shorter than the other. Immense trumpet-shaped flowers appear intermittently in spring, summer and fall. The corolla is about 17 cm. long, the 5 lobes being separated by a distinct sinus or gap.

Even though the leaves and seeds of the angels trumpet are poisonous, these plants are grown in the warmer regions as ornamentals for their attractive pendulous flowers which open at night filling the air with an exotic musky scent.

Editor's note: Mrs. Hayward who wrote about the poinsettia in the last *Green Thumb* has received a report concerning current research on this plant. In this study one hundred and sixty rats (141 females, 19 males) showed no signs of toxicity or any apparent ill effects when given large doses of homogenates made from the leaves, bracts, or flowers of the poinsettia. Preliminary experiments with samples from the top and bottom of the plant, as well as dried material tests with doses as high as 50 g per kg, gave zero mortality. Courtesy *Ohio Florist's Assn., Bulletin* No. 505, November, 1971.

Therefore, some reports on this subject indicate that the poinsettia is not poisonous taken internally as had previously been alleged. Our thanks to Professor K. L. Goldsberry of Colorado State University who called this information to our attention.

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How would you like to grow a Colorado blue spruce tree on your patio, or to have a Japanese maple, flowering shrub, pomegranate, or a tropical such as an orange tree blooming in your living room? The answer is *bonsai* — the art of maintaining in miniature form many types of plant life. The technique requires some skill, and above all much patience and perseverance. Dwarfing requires compression and control of root structures with compensatory pruning of the plant itself, usually daily watering, appropriate fertilization, and often controlled temperatures and light. Yet even an apartment-dweller can enjoy the growing of bonsai if desired.

To see some local examples of this ancient skill, Denverites are encouraged to visit the Second Annual Bonsai Show and Exhibit of the Denver Senior and Junior Bonsai Clubs which will be held at Horticulture Hall of the Denver Botanic Gardens on May 20 and 21, 1972.

Bonsai is an art form using living plants. *Bon* means tray, and *sai* means culture — or flat pot culture. Thus *bonsai* is a plant or tree cultured in a container. It is, therefore, small in size yet expressing the beauty and volume of a tree grown in a natural environment. Bonsai is essentially the art of choosing a plant having the necessary character, strength, and shape. This is then planted in a harmonious container, and grown with complete and constant love, and with affectionate care, so that it blends with the container and thus expresses a natural beauty in miniature. The illusion of space, of depth, and distance is thus created as well as a feeling of quantity and age.

A closely related art is *Bonkei: bon* again meaning tray, and *kei*, landscape or scenery. In this art form, other things are used in addition to one or more trees, such as rocks, gravel, moss, and so forth, to make a small-scale landscape.

Since bonsai is a Japanese word, many people are surprised to learn that this science is still practiced by the Chinese, who were probably the originators of this art. Nonkey T. Ishiyama, in his article *Historical Notes on Japanese Bonsai* provides some interesting information about the origin of the art of bonsai. When the Buddhist religion was imported to Japan from China about 1400 years ago, many earlier civilizations were imported at the same time. The drawing of pictures in the *Sumi-e* style was one. This style, which is still seen in Japanese drawings and done with only one color (usually charcoal, Chinese ink, or juice), showed steep, sheer canyons of rock, or rough, rocky places at the top of mountains where there were few trees. The start of Japanese gardens was in copying these pictures and making them come to life. The first Japanese bonsai were quite large, planted in wooden boxes and kept out-of-doors in the garden, and called *hachi-no-ki* or tree in pot. The name bonsai began after the Meiji period, which started 104 years ago in 1868.



Yoji Yoshimura, instructor of Bonsai at the New York Botanical Garden has said that the history of bonsai, both in China and Japan, may have started a long time ago, but the progression to an art has been only about 150 years. During the past 15 years, bonsai as an art has expanded to places outside of Japan, including many places in America.

Now, what of bonsai in the Denver area? On January 1, 1954 a group of Japanese friends were attending a New Year's party at the home of Shuichi Fukuhara. Everyone present was admiring his Japanese plum tree which was blooming in all its glory. Mr. Fukuhara suggested that it might be fun for them to meet together and learn more about bonsai. Some ten of his friends were in hearty agreement. After several meetings, this group decided to form a bonsai club and 32 charter members joined together to form the Denver Senior (*Issei*, or first generation) Bonsai Club. Their first Bonsai Show was held at the Japanese Community Hall in 1954. A second show was held the following year at the Buddhist Church, and a bonsai show has been held at some location in Denver for each of the past

17 years. The Issei club still has 25 active members and meets monthly at various member's homes. The oldest living member of this group, Roy Suehiro, is 89 years young, and his vigor, spryness, and radiant smile are a constant source of inspiration to those who are privileged to know him.

When the Senior Bonsai Club was holding its annual show at the Simpson Methodist Church on November 19, 1969, one of the members of this church, Leo Murakami, thought that some of his generation (*Nisei*, or second) should be learning something about the bonsai art while the Issei members were still alive and willing to teach them. He posted a paper at the door on which anyone interested might sign his name and address. There were 120 persons who signified their interest by signing the list, and 60 of these attended the initial meeting. This meeting culminated in the formation of the Denver Junior Bonsai Club with 35 charter members. The group met monthly at the Simpson Methodist Church with George T. Fukuma, a member of the Senior Club, serving as the *sensei* (teacher) to instruct them in the basic principles of bonsai. With arrival of spring, the members' intense interest and overwhelming desire to start planting trees of their own suggested the advisability of meeting twice each month. The Junior Club has continued to meet on the first and third Tuesday of each month since that time. Information about the Denver Junior Bonsai Club may be obtained from Marthena Cavnar, 7202 W. Cedar Circle, Denver. Colo. 80226 (233-0995).

The Junior Club admits it has a long way to go to catch up to the Senior members, several of whom have 200 to 500 bonsai trees each. One Issei member has a tree estimated to be 1000 years of age. The enthusiasm and interest of all members continues to grow; each rejoices with a success, and mourns every loss just as a parent mourns the death of a child. Success in bonsai requires constant attention, care, and love – affection as you would give your own child. Proper soil, adequate water, necessary fertilizer, essential sunshine or shade, and periodic pruning, wiring, and repotting are required for each and every plant. The need for devotion to this art is quite apparent.



The Japanese regard their bonsai with great reverence, as the story of the acquisition of the "Fudo", after eight months of negotiation and communication by the Brooklyn Botanic Garden, will demonstrate. The "Fudo" is a Chinese juniper (*Juniperus chinensis* var. *sargentii*) with an estimated age of 600 to 1000 years – probably the oldest living plant ever shipped to America – which was recently acquired by the Brooklyn

Botanic Garden from Kyuzo Murata's Nursery of the Nine Mists in Omiya, Saitama Prefecture, Japan. Mr. Murata is said to have desired to keep this fine tree in his private collection as long as he lived. Nor was it easy for the townspeople to see this prestigious specimen go to another land. But, after months of thoughtful consideration of the increasingly harmful effects of air pollution to trees in the garden, the immense value of having Americans exposed to appreciation of this rare example of the bonsai art, and the fine care it would be given by the staff of the Brooklyn Botanic Garden, the owner finally decided that the people of the United States should have the opportunity to enjoy this priceless tree. Mr. Murata is alleged to have felt that he was giving his own daughter to an American to be joined in marriage.

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The Denver Botanic Gardens
ANNUAL REPORT
for
1971

comprising a separately paged part of

The Green Thumb magazine

1971
PRESIDENT'S REPORT
Denver Botanic Gardens

It is a pleasure to report to the members of Denver Botanic Gardens on the events and progress of the year 1971. It has been a year of great activity at the Gardens in the development of both program and physical facilities.

Appropriate it is, first, to mention the many people who have been involved in this activity, including the Board of Trustees, the officers, the City Administration, the staff, and the hundreds of devoted volunteers. The Trustees have acted with interest and wisdom in their planning for the development of the Gardens and, of course, have been very active in raising the necessary funds to accomplish these plans. The City Administration not only has provided its moral backing but also has continued its vital support in the form of the operating budget. The staff, under the leadership of Dr. William G. Gambill, Jr., Director, and Mr. Andrew R. Knauer, Assistant Director, have diligently executed the development plans as funds have become available and have put into effect the gradually expanding educational and display programs. Other members of the staff working closely with them have shown a high degree of support of our purposes.

The volunteers are in a class by themselves, and we would be far short of the position we have reached if we had not had their great dedication assisting us along the way. The countless hours of voluntary time devoted to Denver Botanic Gardens by these groups, the Denver Botanic Gardens Associates, the Denver Botanic Gardens Guild, the Around the Seasons Club, are greatly responsible for our progress. The estimated 11,000 volunteer hours contributed in the operation of the Gift Shop, for example, not only add to the attractions at the Gardens but also have contributed substantial funds toward special projects and the general operating budget. A voluntary committee, also, from the Garden Club of Denver has ably assisted in the changing exhibits in the Lobby Court Garden, which provides such a beautiful entrance to the Conservatory and to the Education Building.

A significant accomplishment during the past year has been the attainment of the $850,000 goal of Phase II of the Development Fund. Through the efforts of a great many people $855,000 has been contributed or pledged to this fund. An impressive part of this amount, $242,430, has been contributed or pledged by the Board of Trustees as a group, including every member during the past three years.

The long range plan for the development of the York Street Gardens is being put into effect as funds are received from the Development Fund drive. Accomplished to date have been the Master Plan, itself, for the development of the York Street Gardens as prepared by Eckbo, Dean, Austin & Williams, the purchase of the LaJolla Apartments and additional property in the block to the north of the Boettcher Memorial Center, the completion of virtually the entire water-oriented system this past fall, the construction of the York Street gates and gatehouse, and a modest addition to the Endowment Fund. In addition much of the furnishing of the Education Building has been made possible. As more pledges are paid and, hopefully, additional contributions, made, execution of the Master Plan will continue.

No one and no thing can escape the effects of the inflation which has gripped this country in recent years. Cost estimates made three to four years ago for parts of the Master Plan have proven inadequate in this situation, and it has become necessary for the Board of Trustees to seek supplemental funds for remaining features. Most important and primary at this time is the construction of the major paths, walkways and roads throughout the Gardens to provide access to them and permit the resumption of planting of botanical material, hopefully later this year. Currently the board, divided into three teams, is engaged in a friendly "War of the Roses" to raise an

additional $100,000 for this purpose. The goal is not yet in sight, but there have been some encouraging developments. It is hoped that this construction can be completed this spring. Other construction under way or expected to be accomplished at the same time is a major part of the service area to the northwest of the Conservatory and the completion of foundations and footings, to the extent of available funds, for the two additional greenhouses in that same area. This work is being carried out through the use of limited funds provided by the capital improvement budget of the City & County.

We record with sorrow the loss of two members of the Board of Trustees, Mr. J. Clinton Bowman on October 27, 1971, and Mrs. Charlotte Barbour on December 29, 1971. We will miss their counsel and their association with us in accomplishing projects in the planning of which they shared.

New trustees have been elected to the board as follows:

Mr. Ralph Becker
Mrs. John Brooks, Jr.
Mr. Alexander L. Kirkpatrick
Mrs. Howard Rea
Mrs. David S. Touff

Again my many thanks to the Mayor and Council of the City & County of Denver, the officers, the trustees, the staff, and the volunteers for a most successful 1971.

Respectfully,

John C. Mitchell
President

1971
DIRECTOR'S ANNUAL REPORT

Introduction

The year 1971 was unquestionably one of the busiest and most productive ones in the history of the Denver Botanic Gardens. The opening of the Education Building resulted immediately in a rapid expansion of the activities and educational program sponsored by the Botanic Gardens. Substantial and consistent progress in the reconstruction of the outside gardens according to the Master Plan has brought the completion of the new gardens closer to reality. Addition of new staff members helped the Botanic Gardens move forward significantly in many aspects of its program. Numerous improvements were carried out in the already existing facilities of the Botanic Gardens. Memberships in the Botanic Gardens showed a very encouraging upswing. And exciting new plans for the future were set in motion.

Staff

In 1971 a Director and an Assistant Director were at work together at the Botanic Gardens for the first time in a number of years. Twenty-one permanent staff members were on duty out of a total of 23 provided for in the table of organization of positions funded by the City and County of Denver; 6 temporary, seasonal workers paid by the City worked at the Gardens during the busiest part of the season. Nine persons were hired as part-time employees by the Denver Botanic Gardens, Inc. These

positions included the secretary for the Development Fund and for publicity and public relations, the operator of the label-engraving machine, the Instructor in the Children's Garden, the professionally trained Assistant Librarian, weekend clerks in the Gift Shop, the Editor of *The Green Thumb,* and the custodial worker for the Botanic Gardens House.

For the first time, the Botanic Gardens had the full-time services of an Educational Director (Horticultural Education Specialist), a professional Librarian, and a Grounds Foreman.

Attendance at the Gardens

After the opening of the Education Building in March, 1971, records show that 18,212 persons attended meetings held there by botanical, horticultural, conservation and other groups. Classes held in the new building attracted 6,250 persons. Special events, primarily plant shows, attracted 25,756 visitors to the new facilities offered in the building. Nearly 210,000 persons passed through the counting turnstiles in the foyer of the Conservatory, Meetings of plant and conservation-oriented groups in the rooms of Botanic Gardens House attracted another 4,522 participants in 1971.

The Education Building

The doors of the Education Building, the newest addition to the Boettcher Memorial Complex, were opened to the public in the first week of March, 1971. The Education Building, as it is generally called, provides the following facilities for the Botanic Gardens: Horticulture Hall, an auditorium with a stage at one end and with seats for nearly 500; a Plant Preparations Room adjacent to Horticulture Hall; the Helen Fowler Library; the Kathryn Kalmback Herbarium and the Herbarium Display Area; the Lobby Court with its fountain, pool and display area surrounding the pool; three rooms designated as Lecture Rooms or Classrooms; a Research Laboratory; a Dark Room and storage rooms.

Lobby Court Displays

Opening with a stunning display of flowering hyacinths in three colors overtopped by young white birch trees at the time of dedication, the Lobby Court Garden Area featured the following plant displays during the year: Succulents and cacti, Easter lilies with flowering primulas, "Bonsai plants", tuberous begonias, a colorful fall display of chrysanthemums with fall fruits, orchids, poinsettias with white chrysanthemums, hanging baskets of various plants, groupings of tropical foliage plants, and azaleas and rhododendrons. The Garden Club of Denver has provided generous financial support for these displays, and a committee from that club has worked closely with staff members of the Botanic Gardens in planning the displays.

Horticulture Hall

The availability of this handsome auditorium has made possible the scheduling of numerous activities which are reflected in the following facts and figures. The following shows were held in Horticulture Hall in 1971 after its opening in early March, and the estimated attendance at each is indicated: Rocky Mt. African Violet Show, 2,500; Ikebana International Show, 3,000; Bonsai Clubs of Denver, 1,500; Iris Flower Show, 2,000; Colorado Water Color Exhibit, several thousand; Gloxinia Gesneriad Growers Show, 2,000; Colorado Gladiolus Show, 3,000; Children's Garden Fair and Graduation, 500; Orchid Show, 2,000.

Various organizations have held regular or special meetings in Horticulture Hall for large groups in 1971. Among them were the following: Colorado Nursery and

Shade Tree Conference, CSU Landscape Management Workshop, Denver Rose Society, Dahlia Society, Iris Society, Rocky Mt. African Violet Council, Colorado Mountain Club, Ikebana International, Sierra Club, Children's Garden, Garden Club of Denver, Denver Botanic Gardens Annual Plant Sale, Denver Botanic Gardens Annual Christmas Sale, Bonsai Clubs of Denver, "We Care", Colorado Mycological Society, Colorado Gladiolus Society, Historic Denver, Rocky Mt. District Rose Judging School, Junior League of Denver, National Junior Horticulture Association, Young Audiences.

Public Lecture Series

Free public lectures were scheduled in Horticulture Hall in the spring and autumn months in 1971. The following persons were included on the 1971 lecture schedule. February, Dr. William G. Gambill, Jr., "Is There a Botanic Garden in your Future?"; March, Mr. and Mrs. Vernon Tomppert, "Colorado Wild Flowers" and "Flower Interlude"; March, Mrs. Ann Zwinger, "Constant Friendship"; April, Dr. George Williams, "Responses of Woody Plants (Including Aspen) to Environmental Conditions"; May, Dr. F. L. S. O'Rourke, "Flowering Trees of the World"; June, Dr. James Feucht, "The American Elm: A Plan for Survival"; October, Dr. Helen Marsh Zeiner, "Wildflowers – Getting to Know Them"; November, Dr. and Mrs. Gordon Alexander, "A Garden Tour in Britain"; December, Dr. J. W. Brewer, "Approaches to Insect Control".

Courses of Instruction Offered

Since one of the primary functions of a botanic garden in a large metropolitan area is educational, the Denver Botanic Gardens made significant progress toward that goal by offering several types of courses in 1971. The following courses were offered for a ten-week period (approximately one academic quarter) by the staff member or guest instructor indicated: "Tropical Plants for House and Garden", Bibee, 3 qrs.; "Home Landscape Design", Knauer, 1 qr.; "Identification of Trees and Shrubs – Gymnosperms", Gambill, 1 qr.; "Spring Flora of Denver and Vicinity", Gambill, 1 qr.; "Flower Arrangement for Beginners", Mrs. Robert Kosanke, 1 qr., also 5 weeks in summer; "Bonsai for Beginners", George Fukuma, 1 qr.

The Community College of Denver offered a course in the fall quarter entitled "Floral Design Workshop". Taught by Mr. Lee Ashley, the course offered 6 hours of college credit, and approached the principles of floral design and the operation of a flower shop from the vocational standpoint.

The Denver Public Schools again offered a summer botany course for high school students, for credit, at the Denver Botanic Gardens. Entitled "Botany Seminar and Field Study", the course was taught by Mr. William Bollacker of the George Washington High School faculty.

Numerous short courses lasting for a half-day or less were offered during the year by staff members as follows: "Pruning of Trees and Shrubs", Knauer; "Lawn Care", Knauer; "Hanging Baskets – Eye-Level Gardening", Blades; "Suburban Vegetable Gardening Techniques", LeMay; "Annual Garden Flowers", Pincoski; "Summer Care of Roses", Knauer; "Dividing and Transplanting Perennials", Knauer; "Field Trips in Identification of Woody Plants of the Denver Area", Gambill; "Preparing Garden Soil", Knauer and Schell; "Preparing your Garden for Winter", Knauer.

The Children's Garden

One of the more successful educational projects of the Denver Botanic Gardens is the Children's Garden. In 1971 approximately 130 youngsters in ages from 9-15 took part in this program. Beginning with a series of instructional classes on a wide variety of topics pertinent to preparing, planting and maintaining a garden, these children planted and grew vegetables and flowers in individual plots of approximately

100 square feet. A Garden Fair for the public and "Graduation" ceremony climaxed the successful season in September. Mrs. Irene Vittetoe serves as Instructor in the program, and supervises the children's work in the gardens with the aid of a number of loyal volunteers, and, of course, the parents of the children. Beverly Pincoski is the staff member who directs and correlates the Children's Garden program.

Open Garden Day

Open Garden Day was held at the Botanic Gardens on Sunday, October 10, from noon until 4 p.m. to permit visitors to inspect the progress that has been made in the reconstruction of the outdoor gardens on York Street. Phase I of the master plan was complete at that point. The 17 acres of the outdoor gardens has been reshaped from a nearly flat surface into a succession of mounds, depressions and partially enclosed areas. An extensive underground frost-free irrigation system has been installed, and a very handsome surface ornamental waterway has been completed featuring fountains, channels, sluices, spills and waterfalls, as well as four 15-foot pylons from which the water gushes to start its way along the system. The ornamental water system was turned on especially for the occasion. Volunteers, Trustees and staff members guided over 5,000 visitors along a pathway marked with brightly-colored ribbons and balloons, on a perfect "blue and gold" autumn day. Visitors were also invited to inspect the Conservatory and the new Education Building. The public came, saw, and appeared to be delighted by what they saw; certainly those present had a much better understanding of what has been going on behind fences and gates for so many months. Additional such occasions are planned for 1972, to keep members, friends and new visitors informed of the progress being made in building a magnificent new garden.

Wild Flower Field Trips

In cooperation with Dr. Brunquist, Curator of Botany at the Denver Museum of Natural History, the Botanic Gardens offered biweekly field trips to various points in the Denver area to study plants in the field, particularly wild flowers. These trips began the first of March and were terminated at the end of September, and were very well attended. Dr. Helen Marsh Zeiner of the Denver Botanic Gardens volunteer staff shared leadership of the trips with Dr. Brunquist, as did various other persons, on occasion.

Memberships

As of January 1, 1972, the total number of all memberships in the Denver Botanic Gardens stood at approximately 1700. This represented an increase of about 600 members in all categories during the calendar year of 1971. Although this increase is gratifying, there is, almost certainly, a potential membership of several times that number in the Denver Metropolitan Area. Plans are being laid to mount a special membership campaign in 1972.

During the past year the Board of Trustees authorized an increase in the annual dues for the regular membership from $5.00 to $7.50. This action was based on the fact that generally increasing costs had brought the Botanic Gardens to the point at which $5.00 was inadequate for maintaining an annual membership. As of January 1, 1972, new regular memberships were raised, therefore, to $7.50. Renewals of regular memberships were to be raised to $7.50 as of April 1, 1972. Fees for other memberships were set as follows: Participating Membership, raised from $10.00 to $15.00; Supporting Membership remained at $25.00; Contributing Membership remained at $50.00; and Sustaining Membership remained at $100.00.

Two new types of memberships were instituted as a result of Board of Trustees action in 1971. The Junior Membership, for persons up to 16 years of age, was set at $2.00 in 1971, and has been raised to $2.50 as of January 1, 1972. All those who completed the Children's Garden program in 1971 were awarded this membership, and thus they became the first class of Junior Members. The membership is open to all young people of the age range indicated. A bimonthly newsletter for Junior members was initiated, and christened *The Jolly Green Gardener* following a contest among the members.

A new membership for Business and Educational Institutions was set up at $100.00 a year to permit business firms and educational institutions to help underwrite and participate in the program of the Denver Botanic Gardens.

The Helen Fowler Library

Under the capable direction of Mrs. Solange Huggins, Librarian, and with the loyal cooperation of a volunteer committee headed by Miss Lucy M. Crissey, the Helen Fowler Library achieved unparalleled growth and development during 1971. The Library moved to its handsome new quarters in the Education Building in March, 1971. Here it attracts many visitors and patrons, and it is rapidly becoming one of the most successful operations at the Denver Botanic Gardens. The Library is open to the public a total of 52 hours per week, and seven days each week (Monday through Saturday, 9 a.m. to 5 p.m., Sunday, 1 p.m. through 5 p.m.) In 1971 a total of 1866 books was circulated. The number of books added to the collection in the past year was 441, of which 198 were purchased and 243 were gifts. Thirteen journals were added in 1971, of which four were gifts. A total of 23,904 persons visited the library in 1971, while the number of persons using the library was 6,953.

The James J. Waring Rare Book Room was completed and forms a very valuable addition to the library facilities. Rare books from the Helen Fowler Library have been placed in the room, which is provided with automatic temperature and humidity controls. The Waring collection of rare botanical books is being moved to this facility.

A children's collection was established in the Library in 1971. Books from the general collection, of special interest to young gardeners were segregated and became the nucleus of the collection to which more than forty new books were added.

Very welcome financial support was made available when the Associates of the Denver Botanic Gardens pledged a contribution of $100.00 per month to the budget of the Library, beginning in October, 1971. The Helen Fowler Library now contains somewhat in excess of 3,500 books and 135 periodicals.

Publications

Beginning with the January, 1971 number of the *Green Thumb Newsletter*, the editorship was transferred to the Education Specialist as a duty of that office. (Mrs. J. V. Petersen, who had served as Editor so capably for a long period of time, asked, earlier, to be relieved of her duties.) Mr. James Schell, who joined the Botanic Gardens staff as the first person to occupy the position of Education Specialist, served as Editor until he left the Botanic Gardens in October, 1971, to begin work on his Ph.D. degree at Kansas State University. With the February number, the format of the *Newsletter* was changed from a 2-page size to a 4-page size. This was necessitated primarily by the somewhat precipitate expansion of the monthly calendar of activities at the Denver Botanic Gardens following the opening of the Education Building. At the end of 1971, with the appointment of Miss Margaret Sikes as the new Education Specialist, the editorship of the *Green Thumb Newsletter* became her responsibility. With the July, 1971 issue, Dr. James Feucht, Metro Denver Area Horticulturist

on the staff of Colorado State University agreed to write the portion of the *Newsletter* which offered the monthly "Gardening Tips". His regular monthly contribution has added a great deal to the *Newsletter*, and the Denver Botanic Gardens is grateful for his assistance.

The Green Thumb, quarterly magazine of the Denver Botanic Gardens was edited by David Blades, Assistant Superintendent of the Conservatory, until mid-May, 1971. At that time Mr. Blades asked to be relieved of the editorship because of the pressure of his other duties. Miss Margaret Sikes was appointed as Editor, and took over the position in late May with the Spring issue of the quarterly. Upon her appointment as Education Specialist in December, she agreed to remain as Editor of *The Green Thumb* until a replacement could be found. In 1971 the quality of the contents of *The Green Thumb* was maintained at a very high level, despite the tribulations endured by the staff of the quarterly with a change in publisher.

The Conservatory Plant Guide was revised completely during the past year, and the new edition appeared in August, 1971. The revision was not published as an issue of *The Green Thumb*, as was the case with the original edition, but appeared as a separate publication. Mrs. Phil H. Hayward served as Editor and chief contributor of the new edition; Dr. A. C. Hildreth, Dr. Helen Marsh Zeiner and Mrs. J. V. Petersen were Editorial Assistants. Mr. Phil Hayward designed the very attractive cover and also drew the plant illustrations in the book.

The Conservatory Guide lists the common name, botanical name and plant family of 100 plants growing in the Botanic Gardens Conservatory. Characteristics useful in the identification of each plant as well as a few facts of general interest to the layman are also provided. A map is included showing the location of each plant in the Conservatory, making it possible for the visitor to guide himself through the Conservatory. The *Guide* is available at the door of the Conservatory for 50 cents per copy.

Kathryn Kalmbach Herbarium

The Kalmbach Herbarium was moved from Botanic Gardens House to spacious new quarters in the Education Building in February, 1971. The size of the Herbarium was doubled (it now stands at somewhat over 10,000 sheets) when the Herbarium of Denver University consisting of more than 5,000 sheets was transferred to the Denver Botanic Gardens and incorporated with the 5,000 sheets of the Kalmbach Herbarium. Twelve herbarium cases are now used in housing the collections which continue to grow in number and usefulness. An interesting addition to the Herbarium was the arrival of a collection of 150 specimens from Denmark sent to Dr. William Gambill in the form of an exchange by Dr. Jorgen Jensen of Copenhagen.

The Herbarium is open to the public one day each week, and can be used by appointment on other days. Dr. Helen Marsh Zeiner, as Chairman of the Herbarium Committee, is in charge of the collections. The Herbarium Display Area, on the balcony outside the Herbarium room and overlooking the Lobby Court features a display of named living plants of current interest, particularly plants which are currently in bloom in the Denver area. This display is open to the public each day.

The Mycological Society of Colorado

The new Research Laboratory on the lower level of the Education Building, is the center of activity in a long-range research project of the Colorado Mycological Society. Heading the project, and serving as its chief researcher is Dr. D. H. Mitchel, prominent Denver physician and coauthor of the publication, *Mushrooms of Colorado and Adjacent Areas* with Mary Hallock Wells (published by Denver Museum of Natural History). The laboratory is being used for detailed taxonomic studies on the fleshy fungi and, more recently, the slime fungi of Colorado. The Herbarium of the Mycologi-

cal Society contains over 3,000 specimens of dried and documented fleshy fungi, accompanied by color slides of most specimens, and is kept in a basement storeroom adjacent to the research laboratory. This collection of fungi is by far the largest in the State of Colorado, and represents a very valuable research and teaching tool. It is hoped that a course in the taxonomy of the fungi of Colorado can be offered at the Denver Botanic Gardens in the not too distant future.

Research on Woody Plants Suitable for Cultivation in Colorado

The construction of heated deep frames, cold frames, and nursery beds in recent months at the Denver Botanic Gardens will make possible some experimentation with woody plants whose suitability for growth as ornamentals in Colorado has not been proven. This research is just beginning, since facilities for it have not been available until now. Expansion of this project into one of the more important research contributions of the Denver Botanic Gardens is being planned, under the direction of Mr. Andrew Knauer, Assistant Director.

Improvements to Buildings and Grounds during 1971

A large number of minor improvement projects in the buildings at the Botanic Gardens and around the grounds were carried out during 1971. In some cases these were done with the aid of funds from Botanic Gardens, Inc., and in others with funds from the City Budget. Most of the projects were carried out by members of the staff and work force of the Botanic Gardens. Certain others of a more comprehensive nature were carried out as contract jobs. Following is a listing of the more important projects which have resulted in making much better use of the space in the buildings, or have improved the appearance and usability of portions of the grounds.

a. Botanic Gardens House

1. Rooms formerly occupied by Herbarium, CSU office, and Library converted into attractive staff offices and Conference Room. Larger room made available for CSU Horticulturist's office and staff.
2. New carpeting installed on stairway, in upstairs hallway, and newly donated carpeting in offices; new drapes in some rooms, repairing of carpeting in living-room, recovering of some upholstered chairs.
3. New fluorescent light fixtures in some poorly-lighted offices. Large basement room redecorated and equipped with better lighting; addressograph equipment and label engraving machines moved there; new treads on stairs to basement; restroom in basement redecorated and revamped.

b. Conservatory Building

1. Extensive remodeling of Gift Shop following plans from Hornbein and White, Architects, and contracted by Tamminga Construction Co.; enlarging of Gift Shop permitting expansion into maximum area available; construction of Gift Shop office; installation of attractive carpeting, and new overhead lights; costs of over $7,000 funded by proceeds from the Gift Shop.
2. Extensive renovation of Conservatory Garage area providing work areas with fencing and security locks for general storage area, carpenter shop, maintenance shop and gardeners' shop; four fenced and locked tool compartments, with tools for each marked with identification color.

3. Office for Horticultural Education Specialist provided by remodeling former Gift Shop storeroom, providing it with new lighting, carpeting and furniture. Office space for secretary to Education Specialist provided by revamping small area off the foyer and enclosing it with a "divider".
4. Rewiring of portions of the Conservatory, contracted by Kennedy Electric Co. with funds from City Budget. This represents the first phase of relocation and replacement of portions of the Conservatory wiring system.

c. Landscaping around Education Building

1. Planned by and executed under the supervision of the Horticultural Advisory Committee, and with the aid of a generous grant from the Associates of Denver Botanic Gardens in the amount of $5,000.00.
2. Attractive plantings utilizing the following plants were made: golden-rain tree; "Skyline" thornless, podless honey locust; Shuber choke-cherry; river-birch; bristle-cone pine; eastern white pine; pinyon pine; "Tammy" juniper; evergreen mountain mahogany; compact oregon grape; "Koreanspice" viburnum; "Manhattan" euonymus; "Wyatt" firethorn; "Katherine Dykes" potentilla; cranberry cotoneaster; spreading cotoneaster; cut-leaf sumac; bald cypress.

d. Deep Frames and Propagation Beds

1. Construction of five deep frames, both insulated and heated, to use as hot frames in winter and moist frames in summer, along north fence of Botanic Gardens, opposite Conservatory.
2. Construction of nine open nursery beds separated by paved paths and with irrigation outlets to each bed, along north fence of Botanic Gardens opposite Conservatory.

Acknowledgments

During the course of the year, the Director has worked closely with a large number of volunteer helpers in addition to members of the staff. In an attempt to recognize these persons individually, the names of volunteers are being printed elsewhere in this report. If some names are inadvertently omitted, the Director will appreciate having them called to his attention. Where so many persons are involved, errors of omission may occur, and if this has happened we are very sorry. The Director wishes to take this opportunity to express his deep gratitude for the fine cooperation he has received during the past year from members of the Board of Trustees, Staff members, and volunteers.

Special thanks are due also to Mr. Joe Ciancio, Manager, Department of Parks and Recreation; Pat Gallavan, Director of Parks; David Thibault, Administration Officer; and Nòrma Williams, Personnel Officer. These persons have been helpful in many ways during the year, as have other members of the staff of Parks and Recreation.

DENVER BOTANIC GARDENS FOUNDATION, INC.
909 York Street
Denver, Colorado

BALANCE SHEET
December 31, 1971

Cash Accounts:		
Checking Accounts	$ 8,148	
Savings Accounts	97,721	
Tax Reserve, Etc.	1,822	$ 107,691
Other Assets:		
Real Estate	201,749	
Conservatory	879,003	
Education Building	861,454	
Master Plan Development	386,617	
Greenhouse	91,802	
Deposited on Land (Restricted)	120,000	
Equipment Owned	8,122	2,548,747
TOTAL		$2,656,438

EQUITY ACCOUNTS

Liabilities:		
Notes Payable	56,466	
Rent Deposits	175	56,641
Fund Accounts:		
Represented by Cash	107,691	
Represented by Other Assets	2,492,106	2,599,797
TOTAL		$2,656,438

ACCOUNTANT'S OPINION

We have examined the above balance sheet and related statements of cash receipts and disbursements and fund balances for the year ended December 31, 1971. The examination was made in accordance with generally accepted auditing standards and accordingly included such tests of the accounting records and such other procedures as were considered necessary in the circumstances.

In my opinion, the accompanying balance sheet and statement of cash receipts and disbursements present fairly the financial position of the Denver Botanic Gardens Foundation, Inc. at December 31, 1971 and the related cash receipts and disbursements for the year then ended.

J. D. Vander Ploeg
Certified Public Accountant

DENVER BOTANIC GARDENS, INC.

A Non-Profit Organization

OFFICERS

Mr. John C. Mitchell *President*
Mr. Harley G. Higbie, Jr. *Vice-President*
Mr. Charles C. Nicola *Vice-President*
Mrs. James J. Waring *Vice-President*
Dr. Moras L. Shubert *Secretary*
Mr. Richard A. Kirk *Treasurer*

STAFF

Dr. William G. Gambill, Jr. *Director*
Mr. Andrew R. Knauer *Assistant Director*
Mr. Ernest A. Bibee *Conservatory Superintendent*
Mr. David A. Blades *Assistant Conservatory Superintendent*
Miss Beverly M. Pincoski *Botanist-Horticulturist*
Miss Margaret Sikes *Education Director*
Mrs. Solange Huggins *Librarian*
Dr. A. C. Hildreth *Director Emeritus*

TELEPHONES

Denver Botanic Gardens 297-2547
Conservatory Superintendent Ext. 21
Education Specialist Ext. 23
Library Ext. 24
Gift Shop 297-2348

ILLUSTRATION SOURCES

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The Green Thumb

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Botanic Gardens House

DENVER BOTANIC GARDENS

DENVER, COLORADO

This is a non-profit organization supported by municipal and private funds.

A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

VOL. 29, NO. 3 SUMMER 1972



THE COVER

Gesneriad – *Achimenes grandiflora*

Photo by Miriam Denham

THE GREEN THUMB

VOL. TWENTY-NINE, NUMBER THREE

Editorial Committee

Mrs. Walter Ash

Mrs. William H. Crisp

Dr. William G. Gambill, Jr.

Mrs. Phil Hayward

Dr. A. C. Hildreth

Mrs. Solange Huggins

Mrs. Robert Kosanke

Mrs. Norton Novitt

Mrs. J. V. Petersen, *Chairman*

Dr. Moras L. Shubert

Miss Margaret Sikes

Mrs. J. P. Steele, Jr.

Dr. Helen Marsh Zeiner

Mr. Wes Woodward, Editor

Published by Denver Botanic Gardens, 909 York Street, Denver, Colorado 80206. Sent free to all members of the organization. Junior membership $2.50, Regular $7.50, Participating $15.00, Supporting $25.00, Contributing $50.00. Business and Educational Institutional $100.00. Single Copies, 50¢.

By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in Boettcher Memorial Center at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colorado 80206, or call 297-2547.

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The Green Thumb

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WES WOODWARD–EDITOR

SUMMER, 1972

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Membership Roster–DENVER BOTANIC GARDENS - 1972 99

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Columnea schiedeana
Epiphytic Gesneriad (on trees)
Native to southern and eastern Mexico

From Captain Bligh to Denver Show

ADVENTURES OF THE GESNERIADS

Miriam Denham

Gesneriads are the members of the plant family, *Gesneriaceae*, to which the common African violet, flame violet (neither of which is a violet), florist's gloxinia, and many less known but often spectacular plants belong. Gesneriads have been grown in botanic gardens and greenhouses for little more than a 100 years and have become popular as house plants only in the past 20 years.

These tropical plants belong to a larger group – the snapdragon order – which includes the catalpas, trumpet vines, pentstemons (beard-tongues), broom-rapes, and unicorn plants. Some gesneriads grow in the lowlands in hot and humid areas. Some grow in the rain forest. Many grow in the cloud forests of the tropics in steep and sometimes almost inacessible areas. Many are epiphytes – perched high on the trunks and branches of trees seeking the sunlight along with orchids, bromeliads, and tropical ferns and mosses. Some of these epiphytes have large brilliant red flowers to attract the humming birds which pollinate them.

Stories of Plant Hunters

Roads are difficult to build and more difficult to maintain in the areas which are richest in gesneriads, and the stories of the hardy plant hunters who brought them into cultivation deserve some attention. Because many gesneriads and orchids grow together in nature and require somewhat similar growing conditions (the gesneriads are easier to grow and bloom more frequently in the home), plant hunters sent after orchids have also collected gesneriads. It is only since World War II that plant hunters have gone looking primarily for gesneriads – and even some of these have come home with orchids. The early plant hunters sent home anything and everything of interest.

While a few gesneriads have acquired common English names – African violet, flame violet, Temple Bells, lipstick plants, Queen of the Abyss, Cape Primrose – most have not. As T. H. Everett has said about other plants lacking common names, "They are neither common nor English." There are no "rules" as to the pronunciation of scientific names. They can be anglicized or given a Latin accent. The purpose of names is communication of ideas. If you try to pronounce a plant name the way it is spelled and the person to whom you are speaking knows which plant you mean, that is all that is necessary. Most plant names are no more difficult than *Chrysanthemum* and *Poinsettia*. They only seem difficult because they are unfamiliar.

Why Raise Them?

Why do we raise exotic plants? Perhaps the question should be, "Why do we raise plants?" We could answer that plants are essential in renewing the air we breathe, but we are not conscious of this and most of us grow plants for the pleasure they give. The poorest indio with a flower potted in a tin can receives the same pleasure that a pampered orchid in a greenhouse gives its owner. We are all aware of the artistic miniature gardens created in the orient in areas where people are crowded and land is scarce. The mention of Anne Hathaway's cottage brings forth a picture of the cottage surrounded by a garden. Perhaps man has a basic emotional need to be surrounded by living (and hopefully decorative) plants.

How did exotic plants reach our home? A complete survey of all that is known about the introduction of plants around the world would fill an encyclopedia. A few journeys and a few gesneriads have been chosen to illustrate the general pattern of early introductions.

The development of the printing press coupled with the many journeys of exploration bringing reports of intriguing flowers, strange fruits, and weird animals led among other things to a blooming of the natural sciences and the development of botany and horticulture.

The earliest account we have of a gesneriad is one of the few nontropical members of this family – that by John Parkinson in 1629 of a plant called, "Blew Beares Eares with Borage Leaves." This is *Ramonda myconii* and is known to have been cultivated in English gardens since 1731. *R. myconii* makes an interesting plant for the alpine garden. While it is considered hardy in the northern United States and we grew it in our rock garden in Boulder for about two years, it does need mid-winter moisture and we believe that it succumbed to drought rather than the cold. With the exception of two other southern European plants, the remainder of the gesneriads were introduced to English and United States gardens from overseas.

By the time of Linnaeus (1753) about a dozen plants were known which are today considered to be gesneriads. He listed *R. myconii* as a *Verbascum* (related to mullein). All of the others (two *Gesneria,* three *Besleria*, two *Columnea*, one *Gloxinia*, etc.) were from the New World. How did these plants travel? Picture the travelling conditions of that time:

The Old Ships

The ships were small and cramped. Sails as a power source were dependent upon the weather. Voyages of any distance crossed a variety of climatic zones and those of any duration a variety of seasons. Salt spray blown by the wind doused the ships except in the best of weather. Humidity promoted the growth of molds and mildew. Hammocks, clothing and bread became moldy. Bread and grains became infested with weevils. Drinking water spoiled and even ran out upon occasion (imagine the thoughts of sailors as precious water was used in the attempt to keep plants alive). Dried meats became rancid and maggoty. Rats gnawed





Columnea hirta Gesneriad native to Costa Rica

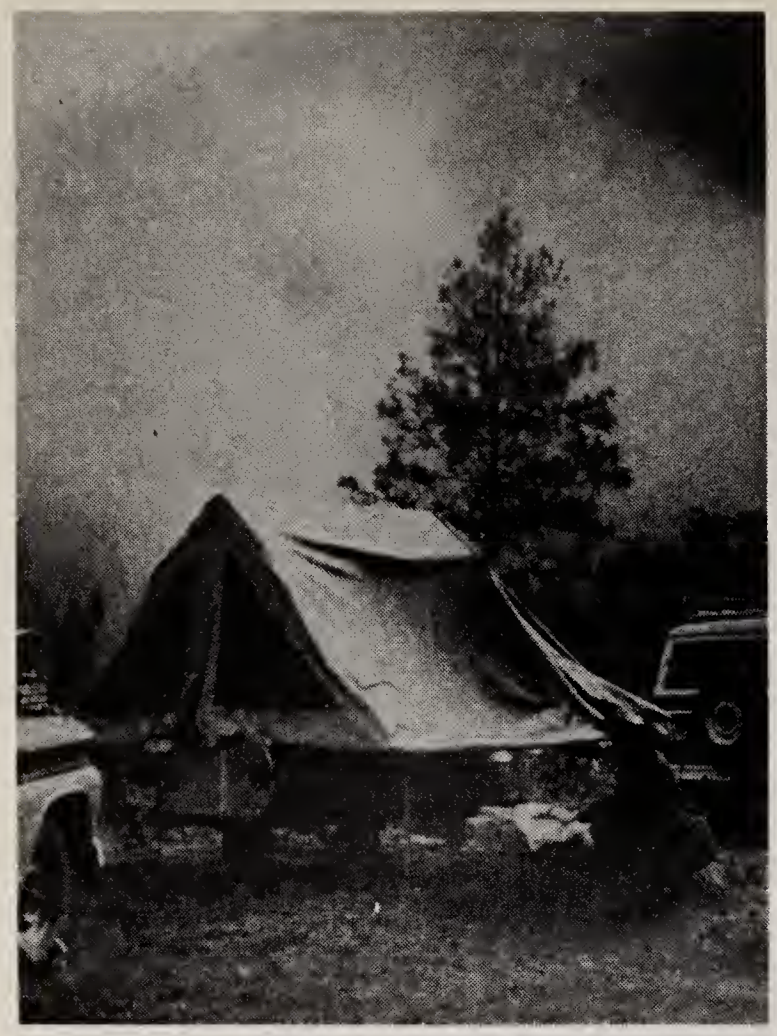
at anything and everything. For extended trips, even the captains and mates did not have comfortable quarters, and those of the crews were worse. Travellers going out tried to return with dried specimens, drawings, seeds and bulbs at first. The dried specimens and drawings only increased the desire to acquire the living plants. One estimate is that perhaps one plant in a thousand survived the ocean trips.

Botanical travellers took the same risks as other travellers – tropical diseases, unfamiliar and sometimes spoiled foods, sometimes unfriendly or even hostile indiginous peoples. Botanists sometimes ran additional perils because of lack of comprehension as to what they were doing, hence their actions seemed suspicious or antagonistic. Many plants were sent home by resident managers of colonial companies such as the Dutch and British East India Companies.

Kalu-Tali

The second earliest gesneriad for which we have been able to trace its history is *Kalu-tali*, a plant from India described by Heinrich Adrian van Rheede tot Draakestein in 1689. More than a century later, in 1826, Karl Blume, Dutch physician residing in the Netherlands Indies, equated *Kalu-tali* with a gesneriad from Java which he was describing as *Rhynchoglossum obliquum* (the oblique snout-tongue). This same year, a Danish Superintendent of the Botanic Garden at Calcutta described the plants from India also as oblique-leaved. These plants were reported as growing like weeds in the hills of India, Ceylon and Java and sometimes used as vegetables. They were considered weedy and of only botanical interest until 1896 when it was noted that under cultivation the gentian-blue flowers increased from 1/2 inch long to an inch and a half. Because it is a non-hardy annual or biennial and somewhat difficult to cultivate, *Rhynchoglossum* is little grown, but it is of interest to note that this is the only genus in the family *Gesneriaceae* to be found in both the Old World and the New World.

A recent book on Plant Hunters by Kenneth Lemmon details the voyage around the world of the Endeavour from



The Denhams breaking camp in the mountains of Guatemala

1768-1771. Captain Cook carried Joseph Banks and nine assistants to collect natural curiosities and observe the transit of Venus. One of these assistants was Daniel Solander, a student of Linnaeus. Only Banks, Solander, and two others of Banks party survived the trip, but many collections and drawings were returned. The outfitting of his team was estimated to have cost Banks ten thousand pounds. Subsequently Banks enthusiastically supported the sending out of paid plant hunters by The Royal Society. Among these was David Nelson who made a trip in one of the ships of Captain Cook's third voyage to the South Seas and Alaska (1771-1780). Many of the tropical plants collected in the tropics were lost in the search for a northern passage to the Atlantic.

Plants on the Bounty

After this trip Nelson worked under Aiton at Kew until recruited to accompany Captain Bligh on the Bounty to collect living breadfruit plants in Tahiti and transport them to the West Indies. The captain's Great Cabin had been converted into a greenhouse for these plants after a specially-built ship was declared top-heavy and unseaworthy. The Bounty sailed from England in December 1787 and only after unsuccessfully attempting to round Cape Horn did the ship turn and sail around the Cape of Good Hope, reaching Tahiti in October 1788 with the log recording over 27,000 miles.

Six months were spent collecting the breadfruit plants and readying them for the trip in pots to the West Indies. In April 1789 the Bounty sailed. Twenty-four days later, Fletcher Christian led the famous "Mutiny on the Bounty", casting Captain Bligh, David Nelson and 17 others adrift in a small boat. Brown stayed with the mutineers, but the potted breadfruit plants were cast overboard. After surviving the hazardous trip by small boat to the Dutch Indies, Nelson died. Brown was shot on Pitcairn in a land dispute. Nelson's journals were lost and we have only second-hand accounts of his botanical searches.

The earliest form of protection for travelling plants were boxes with hoops that could be covered by canvas for protection in bad weather. Although the manufacture of glass dates back into antiquity, greenhouses with glass were first reported about 1730, but the idea of adapting this to transport of plants came much later. N. B. Ward in the late 1830's had buried a butterfly chrysalis in damp leaf mould and soil in a bottle and sealed it.

When a fern plant and a grass seedling sprouted, Ward maintained the sealed bottle without addition of water for several years until the cap rusted through. This experience gave him the idea for building sealed boxes tightly glazed with glass so that plants could receive light and did not need to be watered. Larger models of Wardian Cases became popular for raising ferns in the home. With this method of transport, a much larger quantity of plant material was introduced successfully into cultivation. Lemmon credits the Wardian Cases with the success of John Gibson in returning the "Queen of Flowering Trees" (*Amherstia nobilis*)

to England along with orchids and other strange exotic plants.

The Beauty and the Splendour

Gibson's work was facilitated by a letter of introduction to Dr. Wallich at Calcutta. Dr. Wallich had described several species of *Aeschynanthus* (a vining, epiphytic gesneriad with large, bright orange flowers) and Gibson is believed to have introduced some of these to English greenhouses. Gibson said the *Aeschynanthus* "do not yield in beauty and splendour to any other production".

One last collector will be mentioned, Theodor Hartweg, a German who was hired by the Royal Horticultural Society of London to travel in the higher regions of Mexico to collect hardy and half-hardy plants to be grown outdoors in England. Arrangements were made to send his collections to England by Her Majesty's Mexican Packets, whenever room could be found for them, without inconvenience to the passengers. He sailed from England in the fall of 1836, landing at Vera Cruz two months later. He noted the rich tropical vegetation of the lowlands, but spent his time in the highlands according to instructions until the French blockade and other political difficulties caused the Society to send him to Guatemala in the summer of 1839. En route he spent some time at Oaxaca waiting to travel into Guatemala. While there he made several side trips toward both coasts. Among the gesneriads he collected in this area was *Solenophora coccinea*. This plant was collected during a month-long trip to the lowlands near Tuxtepec south of Vera Cruz. (Today a lumbering road is cut through much of this area and can be driven within two days. We covered part of this route, from Oaxaca and from Tuxtepec in 1962, recollecting *Solenophora coccinea*. We had hoped to travel 40 miles off the road to Villa Alta for other plants which Hartweg had collected, only to discover that the road was still passable only on horseback or by ox cart.)

Hartweg continued on horseback and by mule to Guatemala by the high road which is now the Pan American Highway, collecting flowers along the way, including *Achimenes* species, a *Drymonia, Niphaea oblonga* and a "*Gesnera*". After a relatively short stay in Guatemala, the Society sent him to Peru where he collected more Achimenes and Gesneras (among many other plants) before returning to England in the summer of 1843.

As we read the diaries and letters which detail in small measure some of the efforts put forth by the men who first brought these lovely plants into cultivation, we can properly enjoy and cherish their beauty.

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Readers who are interested in seeing some of these plants are invited to attend the American Gloxinia and Gesneriad Society Flower Show, June 30 – July 1, at the Airport Holiday Inn, Denver.



Thioctic Acid as antidote?



MUSHROOM POISONING

D. H. Mitchel

On June 22, 1971, *The New York Times* printed a story of a dramatic recovery from mushroom poisoning following the use of a new drug – a drug so rare it was flown by jet from Naples to Philadelphia to be given to a family critically ill from mushroom poisoning. This was the first time most Americans had heard of thioctic acid, heralded as an antidote for the dread poisoning of the mushroom aptly called The Destroying Angel.

To many novice mushroom hunters, this sounded like the panacea they had long awaited, the cure-all antidote to rid them of the fear of mistakenly picking the wrong mushrooms for the table. No longer would they be frustrated by the mycologist specialist, who obstinately refused to give them a simple rule of thumb for telling the good mushroom from the poisonous "toadstool". Nor would they even have to worry about whether the old wives' tales were true or not, whether the silver spoon turned black, or whether the cap of the mushroom peeled. Utopia for the mycophagist, that peculiar breed of gourmet who gets his kicks from eating mushrooms, had arrived! Or had it? Though almost a year has passed, this, like many other Utopian dreams, still evades us.

The Deadly Cousins

It is true that if thioctic acid proves to be an effective antidote for the poisons of the beautiful white Angel of Death, known scientifically as *Amanita verna*, then about 95% of the fatalities from mushroom poisoning could theoretically be avoided. This Destroying Angel and her relatives, *Amanita virosa* and *Amanita bisporigera*, that are so nearly identical that even the experts cannot tell them apart without a microscope, are responsible for over 90% of the fatal mushroom poisonings in this country. Her more distant cousin, the greenish Death Cap, *Amanita phalloides*, causes most of the deaths in Europe, but is seldom, if ever, found in the United States. Two other cousins, Panther Cap, *Amanita pantherina*, and *Amanita muscaria*, the fly poison of the Middle Ages, are plentiful in Colorado and help bring the batting average of this genus *Amanita* up to the impressive 95%. So, if all of these lovely, but lethal amanita produce the same poisons, and if the highly touted thioctic acid proves to be the specific antidote for this poison, then this dream might come true.

In fact, if this deadly genus were avoided, eating mushrooms indiscriminately might be as safe as the indiscriminate use of other plants – smoking hemp or cactus; chewing coca leaves or morning glory seeds; or even drinking the fermented juice of the grape! – and certainly as safe as using the juice of the poppy! Not that any of these ventures are without harmful, or even lethal effects; I am only trying to put things into perspective!

The Mycophiles were skeptical

The Magic Acid

As usual for Americans, there was a minority group opinion more skeptical about such an easy solution to the problem of mushroom poisoning. To a few biochemists, thioctic acid, originally called lipoic acid, was anything but new. Discovered in 1952 it was tested for a time by physiologists and nutritionists to determine if it was another member of the Vitamin B group of compounds. It was found to enter into the chemical reactions of the body in the metabolism of certain foods, much as Vitamins B_1, B_2, B_6. But it was soon shown that unlike the Vitamin B complex, it was not essential to the diet, since the body could manufacture it readily. Considered useless, since it could not be marketed for either baby's formula or as a health food, it was quickly forgotten. How then, asked the chemists, could such an old hat get such a magic sparkle?

Another minority group expressed their doubts. Eminent mycologists, including Dr. A. H. Smith of the University of Michigan, who has studied mushrooms and mushroom poisoning for years, knew that even the closely related amanita caused different symptoms in their victims. They also knew that analytical chemists in the early 1930's had extracted and identified at least five different poisons from the single species, *Amanita phalloides*, the Death Cap of Europe. Though the complicated chemical structure of these five poisons fell into two basic chemical formulas, it seemed unlikely that one simple vitamin-like compound could render all five harmless.

Mycophile

Even the amateur mushroom students were a bit skeptical; for once the *Mycophile* scooped *The New York Times* by almost a year! Let me quickly explain that the *Mycophile*, loosely translated "Mushroom Lover", is the rather erratic publication of the North American Mycological Association, which the national organization of amateur mycologists in this country. At their national foray in the summer of 1970, the successful use of thioctic acid in amanita poisoning in Europe was reported. One or two members researched the literature, all in Italian or French, and made a brief report in the *Mycophile*. The Toxicology Committee of NAMA then further reviewed the literature and advised against more publication of the European reports without further confirmation. They feared that the novice would be more careless if he thought a cure was readily available to rescue him from a fatal mistake.

Another minority, though larger, it's true, failed to see any excitement in mushroom poisoning generally, and in thioctic acid in particular. This group comprises the medical profession and drug manufacturers. Many of us who are interested in the study of mushrooms

are amazed at the lack of interest in, and knowledge of, mushroom poisoning evidenced by most physicians. We wonder why mushroom poisoning is not included as a reportable disease by the Public Health people, and why pharmacology textbooks skip over the whole topic in one or two paragraphs of information, outdated 50 years ago. Before one condemns this attitude, however, he must realize that this is another area requiring perspective, With over 50,000 automobile fatalities annually in this country; with about 3,000 fatal poisonings; with over 100,000 narcotic addicts in New York City alone, no one can get very excited over 50 fatalities from mushroom poisoning.

How Many Poisonings?

The number 50 is only a rough estimate made in 1955 by extrapolation of European figures and applying them to the U.S. population. This is possibly a high figure, since European people use wild mushrooms much more frequently than Americans, but by the same token, most European collectors are familiar with their local species and make fewer mistakes.

No one really knows how many cases of mushroom poisonings occur. Many cases are so mild no medical attention is sought. Many cases mimic, or are actually, simple food poisoning, so common in the summer months when mushrooms fruit. Mushroom dishes can be spoiled or infected by toxic bacteria the same as any other food. Other cases are those of simple allergy or indigestability that many people may have with strawberries or green apples. With these cases eliminated, however, there are still many serious and a few fatal cases each year – how many will never be accurately known until there is a better method of reporting them. Regardless, the number is miniscule, compared to the tremendous drug problem in this country, and has not claimed the attention of the national health organizations.

Drug manufacturers in this country are certainly not interested in thioctic acid or any other experimental drug used in mushroom poisoning. The regulations of the Federal Drug Administration are so stringent that expensive, exhaustive tests must be done on any drug before it can be released for human use. The demand would certainly never justify this investment of time and money by the pharmaceutical houses.

Course of the Poison

Then why was thioctic acid ever tried in amanita poisoning? To understand this, one needs to know the sequence of events in this poisoning. Unlike simple food poisoning or many milder types of mushroom poisoning, amanita poisoning is very slow and insidious in its onset. First of all, the amanitas taste great, as death bed statements attest. There is no

bitter tangy taste to warn of the danger, as there is in many other dangerous species. Secondly, the first symptom may not occur for 12 to 24 or even 48 hours after the fatal meal. The victim may have completely forgotten that he ate mushrooms by that time.

The first symptoms are those of nausea, vomiting, abdominal cramps, and diarrhea, so common to food poisoning of any sort. When these symptoms subside after four to six hours, the individual may feel better, though weak and dehydrated. He usually assumes the worst is over and doesn't bother seeking medical care. Only after this short reprieve, start the ominous symptoms of increasing jaundice, headache, drowsiness, progressing into stupor, occasionally confusion, or even delirium, and finally coma and death.

Autopsies show damage to blood vessels throughout the body, but the most devastating damage is to the liver, kidneys, and brain. The liver may be almost entirely destroyed – more so than in the most fulminating cases of hepatitis – hence the deep yellow jaundice. The kidneys may cease to function three or four days before death, so that uremia contributes to the terminal coma. The swelling of the brain is thought to be the primary cause of mental symptoms and stupor.

Trials of the Cure

For years doctors have tried, with some success, to protect the liver from damage, either from heavy metal poisoning, or from such poisons as carbon tetrachloride, or virus infections, including the virus of hepatitis, by the use of intravenous glucose and vitamins of the B-complex. In Europe, where government regulations are not so stringent, solutions of purified thioctic acid were made, both in Germany and Italy, for intravenous use. Physicians in various countries tried adding it to the other Vitamin B group of drugs in treating hepatitis from any cause. There were many logical reasons, based on the biochemical reactions involved in the functions of the liver, to warrant this trial.

In 1955 at a medical symposium in Naples, good results were reported from the use of thioctic acid in heavy metal poisoning. In 1958 a Dr. Josef Herlinka in Czechoslovakia published some results that suggested this therapy was useful in various liver disorders. In 1959 Dr. Jiri Kublicka, working in Prague, began treating cases of amanita poisoning with massive doses of this drug. It was his glowing, optimistic report, presented at a medical meeting in Trebon, Czechoslovakia, in 1968, that led to the trial of thioctic acid in the poisonings which occurred in Philadelphia in 1971.

Druing the past year, American toxicologists have cast more doubt on the efficacy of this treatment. The various species of amanita found in this country, especially *A. virosa* and *A. bisporigera* have very small amounts of the group of toxins theoretically counteracted by thioctic acid, but have, instead, large amounts of the other lethal amanita poisons, for which thioctic acid seems to be useless.

Once again we are back to the old dictum: Know the mushroom before you eat it! There is no simple test to tell poisonous from nonpoisonous mushrooms. Don't risk your life for a few cents worth of vegetables!

Top: Forming for New Walks – Botanic Gardens Improvements

Bottom: Steam sterilizing Nursery Plots



THE WORK GOES ON

Denver Botanic Gardens



GARDENING AND THE LAW

Jacob V. Schaetzel

From the time that Eve was told not to eat of the fruit of the Garden of Eden, down to the present time, we have had our trials and troubles over what is thine and what is mine in our gardens. These problems have principally arisen between neighbors. Many people have had pleasant relationships until something occured in the garden to upset their Saturday visits over the fence.

When we are spraying with the new chemical, we must remember that this may have a killing effect on broadleaved plants. We would do well to consider how hard the wind is blowing before we start spraying with a lethal insecticide. If we permit the spray to get on the neighbor's roses or other plants, we are sure to hear from him and, of course, we are liable for the damage. If damage does occur, be sure not to argue over it but tell the neighbor to replace the plant right away and send you the bill.

Insist That Your Neighbor Spray?

We have had a lot of tree spraying around Denver. Some people spray and some of them don't. With infestation spreading from one tree to the next, the question often arises as to whether or not a man can be held liable for damages resulting from failure to spray his own tree. Such a situation recently occured in one of our western states.

The man with healthy trees complained to his neighbor, who had a tree infested with vermin, and asked him to have his tree sprayed. He was told to mind his own business. He then went into court and actually secured an injunction. The court said that a tree infested with vermin, interfering with adjoining owners' ordinary use of their property for occupancy, may constitute a nuisance. The injunction compelled the man with the infested tree to have it taken care of. There is no longer the nice friendly feeling that existed between them, but the trees are healthier.

Trees that are growing on the dividing lines between adjoining properties have been the cause of expensive litigation for more than a hundred years. The question

arises as to who owns these trees? Well, it seems that sometimes one neighbor may own them; the other may; or it might be that both own them.

Two neighbors agreed on a sunny spring morning that both of their properties would be improved if they planted a row of trees down the dividing line. After this was done, differences arose between them. Without saying anything about it, one man, thinking he owned half of the trees, removed every other tree from that long row. The second man thought that he would just take down his trees too. So he proceeded to start chopping down what he thought were his half of the trees. That day an injunction was served on him. The court, much to the surprise and indignation of the defendant, held that two wrongs would not make a right. The first neighbor had no right to take down every other tree because he only owned an undivided interest in the trees. The court ordered him to pay damages and to leave the standing trees alone.

Branches Over The Line

Another gardening problem that often gets into court results from overhanging tree branches at or near the boundary line. If the branches bear fruit on your side, do you have a right to take off the fruit? Can you cut off the branches? Can the neighbor come over in your yard and take off the fruit? In western Kansas, the court said that if the tree stands on the other fellow's land, you cannot take the fruit from any branches hanging over on your property. If you do he can sue you for the value of the fruit.

In another case the tree shaded the neighbor's property. He went into court only to be told that while he was technically correct, nevertheless the damage was so small that the court wouldn't recognize it.

It is pretty well settled as a matter of law that if an owner plants trees or shrubs near or on the property line and you object to it promptly, the courts will protect you if the roots of the trees or the branches extend over on your ground. We gardeners have found out that the roots of trees take up practically all of the nutrients of the soil. We can't raise good flowers and vegetables close to large trees. So if the roots do go over next door and clog sewers or prevent the growing of nice flowers, then I would suggest that a good neighbor policy would demand a compromise.

Some of us still have the idea that when we own a piece of land, we own it from the center of the earth to the top of the sky. That is not always the law, though. Here is one for "Believe it or Not but It is the Law." Two men in Kentucky were living side by side. One was on a hill above the other. A storm came and removed the soil from the uphill property by washing it down hill to the other property. The down-hill man evidently thought that it was a gift from heaven and he used this top soil. But, the court said that the down-hill man could have removed the soil which accumulated on his lot and he was liable for its value if he appropriated the soil for his own use.

Whose Trees?

Nearly all of our courts have uniformly held that trees standing on the boundary line between adjoining owners are common property. Both owners are tenants in common as to the trees. That should lead us to the conclusion that if you don't like the branches over your land, you can't take them off without the consent of your neighbor. He owns those branches just as much as you do. You, in turn, have ownership in the branches on his side of the tree.

If a tree is growing in the next yard and if it is not a "natural" or "volunteer" tree, and if a branch of that tree accidentally falls on your house, the accident not being caused by what we lawyers call "an act of God," the neighbor on whose ground the tree is growing would be liable for the damage. There was a case in our courts where the branch of a tree extended over on the neighbor's property. The branch was on a "natural" tree. The owner, wanting to do a kind act hired

a good tree surgeon to go on the neighbor's property and, at his own expense, remove a branch of the tree. Unfortunately, the branch fell and injured the roof of the other fellow. The court, on receiving the case, said that the neighbor who was trying to remove the branch of the tree had hired a good competent man and he couldn't be held responsible for the negligence of the tree surgeon.

What Is The Law?

The law generally might be stated about like this: A person is not permitted to use his property in such a manner that damage to his neighbor is a foreseeable circumstance. If a prudent person could have foreseen the result of a certain act, or the result of not doing a certain act, then he is going to be liable for the result if injury is caused his neighbor.

Have you ever looked at the fine print on a package of seeds? It states in substance that the seed company is not liable for any damage resulting from planting the seed. They will only replace the seed. If you buy pansy seeds and onions come up you cannot hold the seed house liable. Read your labels before you plant.

In Denver you can't even build a fence without securing a permit. The courts will not allow the building of a spite fence just to shut out unfriendly people.

Finally, my advice would be to try to be the best neighbor possible. If your neighbor wants to borrow anything from you such as your favorite tool, let him have it. If he fails to return it, don't say anything to him because he is sure to get angry. See that your water stays on your side of the fence. Don't let your insecticides get on his flowers, and be sure to control the roots from your trees in order not to interfere with his planting. Try to settle your differences in a friendly manner. If you can't settle the problems amicably, then at least find out the law from your lawyer. Going to court is like going to war; it should only be done as a last resort!

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Enclosed is $ _____ for my annual dues.

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POLLUTION AND PLANTS

Dr. James R. Feucht reports on Pennsylvania Workshop

"Colorado needs more studies to determine just how much damage air pollution causes to our plants," Dr. James Feucht observed in a report on a national workshop on environmental pollution as it affects plants, held at Pennsylvania State University. The report says:

From this workshop several conclusions have been made which apply to the situation in Colorado. First of all, it is obvious that air pollution damage to plants cannot be determined beyond reasonable doubt without adequate and sometimes very sophisticated monitoring and analytical equipment. Plant indicators are a valuable tool, but used alone can lead to erroneous diagnoses because of the mimicking results often encountered from other environmental influences such as nutritional disorders and herbicide damage. A good case in point is the tip burn in ponderosa pine, which was at first thought to be caused by one or more air pollutants. Studies by Drs. Staley and Altman, however, showed conclusively that the injury was from toxic levels of chloride salt and of soil origin.

It would be difficult to estimate the amount of damage to plants in Colorado which is directly or even indirectly associated with air pollution since most studies in the past have been concerned more with public health than the assessment of plant injuries. Companion studies of pollution injury to vegetation in key areas of Colorado should, however, be conducted since the highly urbanized locations are experiencing sufficient air pollution incidents to cause economic losses. Some greenhouse growers are already experiencing alleged air pollution losses. How much effect air pollution has in weakening landscape plants, causing them to succumb to other causes (diseases, etc.) is also an important and as yet unanswered question.



COLORADO IS NOT CONNECTICUT

George Kelly



We can still have good gardens in Colorado while using less water.

I have been preaching the idea that "Rocky Mountain Horticulture is different" for some 40 years now. A few people are beginning to get the idea and find that they can have as good gardens and parks here as any place in the world, if they learn to design their gardens, select the plants to construct them, and learn how to maintain these plants, in a way to fit Colorado's distinctive climate. So long as ample water seemed to be available many continued to use the old methods learned in the moister areas of the east. Now, that the pinch of limited water is beginning to be felt, unless we can voluntarily adopt more of these "different" practices, some regulations must be made which will require everyone to learn ways of maintaining a garden with less water.

Alternates to Bluegrass

It has been estimated that at least half of the water that the communities on the eastern slope use as "domestic" water is used to maintain bluegrass lawns. I certainly appreciate the value of an appropriately designed bluegrass lawn, BUT, I maintain that every square foot of "yard" surface need not be planted in bluegrass for a pleasing effect. Even more attractive and useful grounds may be designed which use other features that require less water. Close to the house, especially the front of the house, a small plot of well kept lawn is most effective, but in more distant areas where the area is not as conspicuous or used as much, a lawn or ground cover requiring much less water can be planned. Groups of flowering shrubs might be appropriate in other areas, dense screens to block off undesirable views may take up quite a little space, rock gardens of desert plants may be used, or groves of trees to give shade and privacy. Carefully designed plantings in the front yard even may be more distinctive and useful than the plain, open bluegrass lawn. It is possible to plan gravel areas or even colored aggregate, though the use of this material has been much abused.

The fairway strain of the crested wheatgrass can be planted at half the cost and can be maintained with less than half the water and mowing, though it still gives the feeling of a bluegrass lawn when seen at a little distance. There are many low-growing native plants which can be used as ground covers on slopes or odd corners that will give a pleasing effect and still require less water and care. True, we cannot use many of the things so freely used in California but we can develop many plants that are adapted to our dry climate.

It is a curious habit of people moving into a new area to consider all native plants as weeds and try to grow all the familiar ornamentals that they have known as children. We have here many native plants that have adapted themselves to our dry climate and alkaline soil over the centuries, but we have not learned to use them. They are truly "different" but no less beautiful. We can get all the landscape effects found in eastern gardens by using these native or adapted plants and save much water.

Water Less Often

As we look over the state we find that evergreens dominate our mountain forests with few native deciduous trees. We find that there are few broadleaf evergreen plants and most of our shrubs have smaller leaves and less conspicuously colored bloom. Bare ground is not all automatically covered with grass as in the eastern, moister areas. We should learn to accept these "differences" and incorporate them into our garden design.

Even with the traditional eastern kinds of plants we can learn to use much less water without affecting their growth. In general a good rule is to "water less often and more thoroughly." Ornamental plants have much deeper root systems than most gardeners realize, and shallow, frequent watering may keep them alive but they can not grow vigorously without moist soil around their roots. Shallow, frequent watering wastes as much as fifty percent of the water used. Hand watering is usually wasted time and water. Automatic sprinklers are often set to come on for a few

minutes EVERY day, which is most wasteful. If they are set to soak thoroughly and are only turned on again when the ground starts to become dry they can be efficient. On heavy soils and steep banks often the only efficient way to water is letting the sprinklers run until the water begins to stand, then turn off for a while and back on again to soak down deep. Then, when thoroughly soaked this ground can go for a week or even two weeks. Putting the water down deep forces the roots to go deep, and only deep rooted plants can be vigorous and fool-proof plants.

Prevent Loss of Water

More than half of the sprinklers used commonly today are very inefficient. It is nice to have those that throw a fine mist high in the air, but we cannot afford them, for often twenty percent of this water never gets back to soak into the soil. A sprinkler that throws large drops of water, low down and slowly, is the most efficient. These can be left to run and soak for a long time and then be turned off for many days. Flooding an area is still more efficient, but takes special preparation and is subject to many abuses. We may have to come to this however, if we cannot learn to use other efficient methods.

ROUTINE watering is most inefficient – watering for 20 minutes every Monday and Friday, for instance, regardless of weather or other conditions. The amount and frequency of watering depends much on the type of *Soil*, the *Slope* of the land, the amount of *Sun* that the area receives and the *Season* of the year. Remember these four S's when planning a watering program.

Plants must have moist soil around their roots at ALL TIMES. In the eastern, moister areas where we developed our garden practices this is almost automatic with the more or less regular rains and snow, but here we very seldom have natural precipitation sufficient to soak deep down and keep the subsoil moist over winter. So, we must learn that it is NEVER time to stop watering, and if we have long open periods of weather in winter, plants may need water. Of course, it is no use to water when the ground is frozen, but if it is frozen it must already have water in it.

Water Deep

Most gardeners are governed too much in their watering by the appearance of the SURFACE of the soil. It is the soil underneath that is really important. Then you will ask, "How can I know when the soil underneath is in need of water?" The answer is so simple that no one thinks of it. "Just dig in and see." This is not too difficult to do, until you learn exactly how much water is needed in every situation of Sun, Slope, Soil and Season.

Finally, after the soil is thoroughly soaked, much water can be conserved by the addition of some sort of mulch over the surface. This is nature's way as can be seen in any forest. There are many things that can be used – peat, ground corncobs, chopped hay, chips from the chipper, leaves (preferably composted). This also cuts down on the weeds that come through and robs the plants of their share of water. When lawns are watered infrequently they may also be allowed to accumulate some "thatch" to their betterment rather than detriment.

Sawdust may be used for mulching when it is more available if a small amount of nitrogen (ammonium sulphate) is added to compensate for the nitrogen robbed from the soil as it decomposes.

Most lawns are overfertilized which only requires more watering and more mowing. True, most lawns are put in soil that is not fit to grow anything, and they need extra food, but if lawns were planted in good soil they would need very little extra fertilizer. Mowing a lawn a little higher than is customary will also encourage the growth without extra water or fertilizer.

Recommended Plants

Here are some suggestions for plants to use in Colorado landscaping which can be grown with much less water than the usual eastern plants:

Most of the pines and junipers will grow with little water. In large pines this

would include the Ponderosa, Scotch and Austrian; in smaller scale the native Bristlecone, Limber, Pinon and the Dwarf Mugho. We have many low growing junipers with which most people are familiar, such as the Pfitzer, Armstrong, Tamarixleaf and Marshall. In the upright type, generally called "cedars", it is best to stick to the native *J. scopulorum* and its named varieties, for they have a root system especially adapted to drier areas.

In deciduous large trees we can use the native hackberry, honeylocust, in its many varieties, green ash, Russian olive, and in special situations, the western catalpa, native pink locust, boxelder, "Chinese" elm and native cottonwood. With just a little more water and care, trees such as the lindens, sycamores, birches, hard maples, or even certain oaks can be grown.

In shrubs we have a great variety of drouth resistant kinds. In areas where only 5 to 10 inches of natural rain can be expected we can use some of the native desert shrubs, including several of the sages (*Artemisia*), desert thorn (*Lycium*), rabbitbrush (*Chrysothamnus*), yuccas, Mormon tea (*Epherda*), buffaloberry (*Shepherdia*), kinnikinnick (*Arctostaphylos*), oaks (*Quercus*), barberries, winter fat (*Eurotia*), greasebrush (*Forsellesia*), buckwheats (*Eriogoniums*), and horsebrush (*Tetrademia*).

Under more favorable conditions, from 10 to 15 inches of rainfall, such as is found over much of the populated area of the eastern slope, we can grow some of the nicer natives such as: elders (*Sambucus*), mountain mahoganies (*Cercocarpus*), serviceberries (*Amelanchier*), sumacs (*Rhus*), chokecherry, hawthorns (*Crataegus*), silverberry and autumn olive (*Elaeagnus*), flowering currant and wax currant (*Ribes*), wild roses, snowberries (*Symphoricarpos*), Apache plume (*Fallugia*), cliff rose (*Cowinia*), antelope brush (*Purshia*), single-leaf ash (*Fraxinus*), mountain privet (*Forestiera*).

In this area there are many perennials that will grow with little water, including the hollyhocks and other mallows, iris, vetches, statice, gaillardia, coreopsis, chrysanthemums, most of the mints, spiderworts, fall asters, bouncing bet, docks, oriental poppy, milfoils, ajugas, penstemons and English daisies.

Bulbs would include such as cannas, dahlias, tulips, gladiolous, narcissus and grape hyacinths.

Annuals, Ground Covers

Many of the nicest annuals will thrive under our conditions. Included are the petunias, zinnias, calendulas, cosmos, marigolds, snapdragons, candytuft, kochia, cleome, lunaria, poppies, portulacas, centuria and celosia.

Used for ground covers of various heights could be: Low species of artemisia, evening primroses, vetches, antennarias, sedums, euphorbias, festuca, flax, *Nepeta mussini*, potentillas, sempervivums, erigonums, cerastium, and even the wild strawberry.

There are several grasses in addition to the crested wheat before mentioned, including some of the grammas, bromes, buffalo and dropseed.

We need to acquaint the general gardening public with these plants, first through our garden writers, then our landscape architects who draw the plans, and the nurserymen who grow and sell these things. At the moment the use of these plants and practices is voluntary, but unless many accept these principles, the time is almost here when their use will be compulsory, if we would still grow good gardens.

TRAVELING WITH TREES AND FLOWERS

Josephine Robertson

While conducted garden tours cover the most ground with the greatest expertise, it is possible to work in many do-it-yourself visits on business and vacation trips. This has been our hobby for years and we have found some useful helps along the way.

Last September, for example, we had occasion to drive to the east coast and planned our itinerary to stop at a dozen arboreta. We had with us copies of *The Directory of American Horticulture* and *Handbook of American Gardens, A Traveler's Guide*. These booklets with the latter going into more descriptive detail list, by states, both arboreta and gardens.

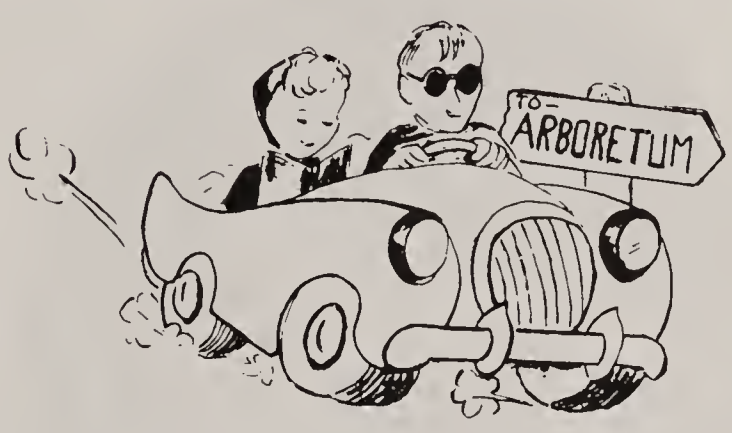
Most of our friends had never heard of an arboretum tour and wondered how anyone, except a professional, could find it interesting. Strictly amateurs, we find it a delightful pursuit, but for different reasons. My husband, a former chemical research director, took up the study of trees from the scientific angle. My field is human interest. I want to know who started the great tree collections and why, the adventures of the early botanists and plant explorers.

It is fascinating to see how the threads interweave: how John Bartram influenced his contemporaries and following generations; how Sir Joseph Hooker of Kew Gardens inspired Henry Shaw to found the Missouri Botanic Garden; how Dr. Manasseh Cutler, friend of Benjamin Franklin, collected plants along the Ohio River in 1788, hoping to found a botanic



garden – a dream realized by his great-great-grandson, Beman Gates Dawes; how the Arnold Arboretum inspired Albert F. Holden, publisher of the *Cleveland Plain Dealer*, to endow an arboretum for his city, the site chosen by Ernest "Chinese" Wilson; how J. Sterling Morton founded Arbor Day a century ago in Nebraska, resulting in the planting of millions of new trees across the country – and surely influencing his son to establish the great Morton Arboretum fifty years later.

Early arboreta and physic gardens were designed strictly for scientific study, not for public enjoyment. England's beautiful Oxford Botanic Garden did not even admit the public for its first two hundred years. Many of today's arboreta, generally pressed for funds, post stern notices that they are NOT parks and NOT for public recreation – such as picnicking. However, since some are located far from eating places, there are, occasionally, picnic tables in some inconspicuous corner. We have learned from hollow experience, to take at least a pocketful of nuts and raisins.



The size of the welcome mat varies. Visitors are admitted freely to the excellent Morris Arboretum of the University of Pennsylvania, but we have found no printed information available on the grounds. At the other extreme is the truly people-oriented Los Angeles State and County Arboretum. Many others, such as Longwood, Morton, Dawes and Holden, have attractive visitor centers offering information. Increasingly, it appears to us, they are reaching out through tours, courses, displays and publications to teach environmental appreciation to the public of both school and voting age.

In Cincinnati we had the privilege of touring an arboretum with its founders, Mr. and Mrs. Stanley M. Rowe, who began planting forty-five years ago and now have opened their large estate to the public. It is particularly beautiful in the spring when the 150 cultivars of crab-apple are in bloom. Mr. Rowe pointed out a small shrubby oak, *Quercus havardi*, which had come originally from the Andrews nursery in Boulder. "At first," Mrs. Rowe told us, "we planted everything people gave us. Now we are wiser and advise others to specialize. It is useful to show what is native and what will grow well in your own locality."

We have joined the American Association of Botanical Gardens and Arboreta, as associate (non professional) members, and find their modest Bulletin full of interesting news – and ideas to file away for future trips.

The arboretum world is a quiet world, but it holds never ending trails of interest, both scientific and human. Furthermore, as Dr. Louis B. Martin comments in his introduction to *A Traveler's Guide*, "Every day is Earth Day at a botanic garden or arboretum."

Exotics of COLORADO



Common Crabgrass *Digitaria sanguinalis*

Helen Marsh Zeiner

The term "exotic" does not necessarily mean a beautiful and rare plant; it merely refers to any plant growing in an area where it is not a native plant. An exotic can be a handsome ornamental, but it is just as likely to be a troublesome weed. This is the case with common crabgrass, *Digitaria sanguinalis* (L.) Scop., familiar to every gardener as an obnoxious lawn weed.

Digitaria sanguinalis is indigenous to Europe but is found at low and medium altitudes in most temperate and tropical areas of the world. It was brought to this country, probably unintentionally, and is now naturalized throughout the United States although it is more common in the east and south. It is to be found in lawns, golf greens, cultivated fields, pastures, gardens, roadsides, waste places or any disturbed soil.

Crabgrass has been able to extend its range so far beyond its natural limits in part because of the enormous number of seeds produced. The *North Dakota Experiment Station Bulletin 112* estimates that 204,000 seeds are produced from a single plant.

We think of crabgrass as a prostrate, creeping mat plant. It is true that when crabgrass is mowed or grazed, it mats close to the ground. Under ideal conditions, however, it will send up stems 6 inches to a foot or more tall.

In the southern part of the United States, crabgrass is a common weed in cultivated soil. It makes a prolific growth in late summer on fields which have been cropped, and it is used as a forage plant or sometimes cut for hay when other forage is scarce.

Crabgrass is an annual grass. It starts growth rather late in the season and often goes unnoticed until late summer when it takes on a purplish hue, making unsightly blotches in a lawn. It grows best in hot weather and is usually killed by the first frost.

The plant is branching and spreading, rooting at the decumbent base. The leaf sheaths are noticeably hairy. Flowers are borne in few to several spike-like racemes in whorls or approximate at the ends of culms. This is a digitate or finger-like arrangement. The genus name *Digitaria* is from the Latin *digitus*, finger. *Sanguinalis* comes from the Latin *sanguis*, meaning blood, and refers to the purplish color of crabgrass.

Common crabgrass is also known as fingergrass, August grass, watergrass, crowfoot, purple crabgrass, hairy crabgrass.

Because crabgrass is an annual, the best controls are those which prevent the production of seed. This might be handpulling of small infestations, but is generally use of a chemical crabgrass killer. There are several of these on the market, and directions should be followed carefully. Early treatment when the seeds are germinating and the seedlings appearing has proved effective. Germination usually takes place in May or June but is variable. Viable seeds may endure in the soil for several years, making a continuing control program necessary.

One of the best defenses against crabgrass is a good growth of blue grass. Close-mowing of a lawn is a common mistake which encourages mat growth of crabgrass and weakens blue grass. Cut your lawn at a height of 2 inches and do not overwater in order to promote a good stand of blue grass and inhibit the growth of crabgrass.

Smooth crabgrass, *Digitaria ischaemum* (Schreb.) Muhl., is also a very common and troublesome lawn weed. A native of Eurasia, *Digitaria ischaemum* resembles *Digitaria sanguinalis* but is not as coarse or as tall. The leaf sheaths are smooth and the foliage is usually more purple.

FOCUS
on



MONSTERA DELICIOSA

in the
Boettcher
Memorial
Conservatory

Peg Hayward

Monstera deliciosa Liebm., a relative of *Philodendron*, is a coarse, woody climber, or liane, native to the jungles of Mexico and Central America. It is now grown in many tropical gardens and under glass in temperate regions for its curious perforated leaves and its sweet edible fruits. This monstrous evergreen aroid, *Araceae* family, will spread along the ground in a tangled mass, or climb over walls, or to the tops of tall trees. It clings to its support by numerous cord-like aerial roots.

Ceriman, also commonly called Mexican breadfruit, has stems up to 3 inches thick. The immense leathery leaves, which are long-stalked, have blades that are roundish in outline but slashed at intervals half way toward the center. The rest of the blade is characterized by large perforations, more or less regularly placed. Their function is uncertain unless it is to protect the leaf from being

torn in the wind. The leaves may get to be 3 or 4 feet in length.

Flowers appear from June to September. They resemble huge calla lilies. A club-like flower spike (spadix) bearing a great cluster of flowers rises from a waxy, white enveloping leaf or bract (spathe). If pollinated, the ovaries mature to become components of a compound fruit about the size and shape of an ear of corn. The fruit matures in the late summer or fall of the succeeding year, some 14 months or more after blooming. The collective fruits are built up of hundreds of small single fruits pressed so firmly against each other that they appear as tile-like, hexagonal sections. The fruit has a delicious fragrance and delectable flavor between that of pineapple and banana, hence the species name *deliciosa.* As the fruit ripens, the sections gradually fall away from the hard core, beginning at the stem end, and reveal segments of cream-colored edible pulp. Not everyone likes the fruit, however, as the spicules or crystals of calcium oxalate which are present cause a burning sensation on the throat and tongue, especially if one attempts to eat portions that are not fully ripe.

The roots of *Monstera* are tough enough to be used as rope and for the making of hats, chair seats, and baskets.

Monstera deliciosa in the juvenile stage is the house plant by some authorities called *Philodendron pertusum* and is even better known as split-leaved philodendron. The youngest foliage is entire and heart-shaped and as it matures it develops first one split, then several. It is propagated by cutting up the stem and rooting the pieces in a mixture of sand and leafmold.

Botanic Garden Guild

MID-SUMMER ANNUAL GARDEN TOUR – JULY 26

Nine lovely "in town" gardens, varying greatly in size and planning, will be visited by those who make the Annual Garden Tour on July 26th, from 10 in the morning until 6 in the evening. Some of these were designed by the owners, one of whom is a landscape architect himself. Some are maintained by the owners, others are professionally cared for. A real treat!

The gardens of:

Dr. and Mrs. William C. Jackson, Jr.	855 Vine
Mr. and Mrs. Charles Nicola	144 Downing
Mr. and Mrs. Norman Davis	222 Cherry
Mrs. Charles P. Gordon, Jr.	414 Eudora
Mr. and Mrs. O. A. Chanute	2515 E. Alameda Circle
Mr. and Mrs. W. H. Kistler	860 So. Madison
Dr. and Mrs. D. W. Hossess	865 So. Adams
Mr. and Mrs. Chris G. Moritz	495 So. Jersey
Mr. and Mrs. William Andrews	1433 So. Eudora

Down-to-Earth Instructions on

DAHLIA GROWING

Edward J. Pankoski



The dahlia in one of the easiest and most beautiful flowers to grow and will produce more flowers, considering size, than almost any other plant.

Plant your dahlias in sunny areas, although shaded places are satisfactory if plants are given more space and kept well thinned out. Dahlias should have an area of their own. Large varieties should be kept 2-1/2 to 3 feet apart in a bed 3 feet wide, or plant two rows in a 4-1/2 to 5 foot bed with 2-1/2 feet between rows. The ideal spot is where the plants get the full benefit of all the morning sun only. However, I have been successful in growing good blooms that are exposed to the hot sun the greatest portion of the day. It is up to the individual to experiment to see what varieties do well in sun or shaded areas. Certain red varieties seem to burn quickly under the hot sun rays.

Prepare the soil for your dahlia beds by spading the full depth of your shovel. Turn the soil over in the fall, if possible, leaving it rough. In the spring turn the soil over again, breaking up the clods and smoothing the soil as much as possible. Loose and bumpy soil dries out fast; smoothing the soil will retain moisture longer.

Dahlias will grow in any soil that has air, sufficient moisture and food in the right proportion. Many soils are in need of air. Heavy, soggy soil can be improved by tilling in peat moss, sand, red wood sawdust and chips, compost, or well rotted manure. If your soil area is very poor, till in bone meal at 5 to 8 pounds over a 100 sq. ft. area. When the dahlias are about a foot high, apply 2 pounds of potash in this area. Till it into the soil around the dahlias and you will have a good fertilizer. (Be sure to keep the potash off the foliage.)

Planting time for dahlias will vary according to the area of the country in which you live. In this area planting begins in early May to early June. You will have dahlias from the early part of August until the first killing frost. The dahlia is a beautiful autumn flower and is usually at its peak after the heat of summer is waning.

Planting the dahlia tuber: Lay the tuber flat in a hole 6 inches deep, with the "eye" sprout pointing up. The size of the tuber makes no difference as long as it has one good "eye" or sprout. Put some fine sand and peat moss, or vermiculite, or fine soil around and over the eye of the tuber and then fill in the hole with 2 inches of the surrounding top soil. The remainder of the hole can be filled in after the plant grows above the surface of the soil. Allow only one sprout to grow from each tuber. When the plant has its third set of leaves, pinch the top out. This will grow a stout branch at the base of each of the six pairs of leaves left. The plant will be lower and produce more and better flowers.

Staking dahlias: Stakes should be 4 to 6 feet long. Redwood makes good lasting stakes. However, leather gloves should be worn when driving them into the ground to avoid painful slivers. Single stakes may be placed in position when planting the tuber in the hole. Place the stake several inches away from the tuber and drive it in at least 12 inches into the soil. Later you risk the chance of damaging the tuber when the stake is driven in. Two stakes may also be used – one on each side of the tuber – driven in about a foot from the plant.

Tying materials should be soft harvesting twine, soft tape materials or any soft materials. They should be tied loosely to avoid cutting and breaking the plant. Old bed sheets torn in 1 inch strips make ideal tying material.

When buds appear, stop deep cultivation, and give the beds a mulch of manure, leaves, or grass clippings. A shallow basin around each plant may also be used and this should be filled with mulching.

Disbudding: Larger dahlias of greater substance with longer and stronger stems may be had by disbudding at the proper time. When buds the size of peas appear, pinch off the buds on the left and right leaf clusters, leaving the center bud if it is in good form.

For healthier looking dahlias give your plants a light shower bath when sprinkling every evening during the hot weather of summer. This shower also helps to hold insects in check.

Sufficient moisture when watering your dahlias is very important in producing good blooms. As the dahlia grows, so grows the demand for water. Your tuber is planted 6 inches deep so water should go down a few inches below this depth.

The dahlia tuber will produce many fibrous rootlets. These rootlets spread all through the soil looking for food and moisture. If the tuber is planted too shallowly, these rootlets work up close to the surface, where they are subject to starvation and burning on hot days. The proper feeding of these rootlets will reward you with a good blooming dahlia plant.

When your first buds appear, stop all deep cultivation around your plants. Cultivation can injure and destroy the fibrous rootlets which are so important in flowering. Budding also indicates that now is the time to begin applying mulch around the plants.

A general rule that is good to remember when watering your dahlias is that a dahlia consumes its weight on each hot day. Therefore, an 8-pound plant would consume a gallon of water a day. Also remember one good watering lasting for several days to a week, is better than a light watering every day. Top watering of your dahlia plants is permissible until the buds begin to bloom; then all watering should be done at ground level.

Should you desire to improve and increase the size of your dahlias, an extra feeding of fertilizer may be applied. This feeding should begin after the buds have formed. If liquid feeding is done, it should be applied when the soil is fairly wet from rain or watering. Do not apply too much fertilizer at this time. Space your applications about 15 days or two weeks apart. There are many good fertilizers on the market but I would suggest you use one where the first element (nitrogen) is much lower than the last two (phosphate and potash). Follow directions on the label or package for how much to use per plant or area.



NEW BOOKS IN THE HELEN FOWLER LIBRARY

Solange Huggins

Since 1 January 1972, the books listed below, in categories, have been added to the collection of the Helen Fowler Library.

AGRICULTURE

U.S.D.A.	Grass; Year Book of Agriculture. 1948.
U.S.D.A.	A Good Life to More People; Year Book of Agriculture, 1971.

AQUATIC PLANTS

Prescott, G. W.	How to Know The Freshwater Algae. 1969.
Prescott, G. W.	How to Know The Aquatic Plants. 1969.

BIOGRAPHY

Garnett, Edward	Letters from W. H. Hudson, 1901-1922.
Roberts, Morley	A portrait: W. H. Hudson.
Peattie, Donald Culross	Audubon's America.
Hyams, Edward	Capability Brown and Humphry Repton. 1971.

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Stocken, C. M.	Andalusian Flowers and Country Side. 1969.
Long, Robert W.	A Flora of Tropical Florida. 1971.
Grant, Verne	Plant Speciation. 1971.
Eyre, S. R.	World Vegetation Types. 1971.
Steward, F. C.	Plants, Chemicals and Growth. 1971.

BOTANY, MEDICAL

Marks, Geoffrey	The Medical Garden. 1971.

ECOLOGY

Sears, Paul B.	Wild Wealth. 1971.

ECONOMIC PLANTS

Jaques, H. E.	How To Know The Economic Plants. 1958.

ENCYCLOPEDIAS

Graf, Alfred Byrd	Exotic Plant Manual. 1970.

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Steward, Albert N.	Manual of Vascular Plants of the Lower Yangtze China Valley. 1958.
Deam, Charles C.	Flora of Indiana. 1970. Reprint. Ref.
Gruber, V. I.	Plants of Central Asia. 1963. Ref.
Curtis, John T.	The Vegetation of Wisconsin. 1959.
Correll, Donovan S.	Manual of the Vascular Plants of Texas. 1970.
Legg, Kenneth	Lake Tahoe Wild Flowers. 1970.
Long, Robert	A Flora of Tropical Florida. 1971.

FLOWER ARRANGING

Swerda, Patricia	Japanese Flower Arranging. 1969.
March-Penny, John	Japanese Flower Arrangement; Ikebana. 1969.

GARDENS

Lawrence, Elizabeth	Lob's Wood. 1971.

GLASS CONTAINER GARDENS

Baur, Robert C.	Gardens in Glass Containers. 1970. Ref.

GREENHOUSE CULTIVATION

Wittwer and Honma	Greenhouse Tomatoes. 1969.

HANDICRAFTS

Iida Miyuki	The Art of Handmade Flowers. 1971.

HOUSE PLANTS

Skelsey, Alice	Cucumbers in a Flowerpot. 1971.
Campbell, Mary Mason	Betty Crocker's Kitchen Gardens. 1971.
Graf, Alfred Byrd	Exotic Plant Manual. 1970.

INSECTICIDE, HERBICIDES AND FUNGICIDES

Page, B. G.	The 1971 Insecticide, Herbicide, Fungicide Quick Guide.
Rudd, Robert L.	Pesticides and the Living Landscape. 1964.

MUSHROOM FOLK-LORE

Wasson, R. Gordon	Soma, Divine Mushroom of Immortality. 1969.

MYCOLOGY

Webster, John	Introduction to Fungi. 1970. Mitchel coll.
Gray, William David	Biology of the Myxomycetes. 1968. Mitchel coll.
Miller, Julian H.	A Monograph of the World Species of Hypoxylon. 1961.

Hale, M. E.	How to Know the Lichens. 1969.

NATURAL HISTORY

Krutch, Joseph Wood	Baja California and the Geography of Hope. 1967.

ORGANIC GARDENING

Philbrick and Gregg	Companion Plants and How to Use Them. 1966.

OUTDOOR GARDENING

Cruso, Thalassa	Making Things Grow Outdoors. 1971.
Sears, Paul B.	Wild Wealth. 1971.

SPECIAL FLOWERS

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American Rose Society	The American Rose Annual. 1972.
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Pravdin, L. F.	Scot pine. 1969.
Rollinger, E. Alan	Pioneer Trees of Metro Denver. 1969.

VEGETABLE GROWING

Heriteau, Jacqueline	The How-to Grow and Cook It Book. 1970.
Wittwer and Honma	Greenhouse Tomatoes. 1969.

WEEDS

Jaques, H. E.	The Weeds. 1959.

The following books were added to the JUVENILE COLLECTION:

Asimov, Isaac	Photosynthesis.
Carleton, Milton	Indoor Gardening Fun.
Cooper, Elizabeth K.	Insects and Plants.
Fenton, Carroll E.	Trees and Their World.
Hutchins, Ross E.	Lives of an Old Oak Tree.
Hutchins, Ross E.	This is a Flower.
Hutchins, Ross E.	This is a Leaf.
Hutchins, Ross E.	This is a Tree.
Lemmon, Robert S.	Junior Science Book of Trees.
National Audubon Society	The Audubon Nature Encyclopedia. Ref.

OLD LEISURE

Wes Woodward

You are at home one day, sick in bed, but not too sick to luxuriate in a quiet morning. Suddenly a horrible rasping, buzzing noise jolts you wide awake, mangles your nerves, jangles in your head.

It's the lawn-mowers next door. You don't have to look to know what is going on. There is a truck with the tail gate down and four or five frenetic little men wrestling gasoline-powered mowers and trimmers onto the lawn. The rasping, buzzing sound is doubled, then tripled, as the infernal machines start up. You know the men are running desperately as the machines drag them furiously back and forth, around and around, efficiently cutting the grass to a Persian rug fineness.

Ten, fifteen, maybe twenty minutes, and the job is done. The machines shut off, one by one. There is much clanking and banging as they go back into the truck. Then they are gone, the normal noises of the city return, and the lawn next door is mowed, trimmed, pared and, probably, shaved. Your nerves are shattered.

This is the modern way of lawn care, of gardening, in a sense. It gets the job done with no dilly-dallying. It's a lot easier than pushing a mower yourself. It may even leave a prettier lawn than you had in the old days, although that is not guaranteed.

It is also a long way from nature and the joy and pride of working with nature.

The machine is fast, efficient, impersonal. It does away with irksome toil. But it leaves emptiness and uneasiness in the soul of a true gardener.

The machine has destroyed some things. Leisure, for one. Oh yes, we have more time for other things we want to do. In statistics we have more leisure. In reality we have little, if any. Time is saved from our chores, so we rush into an automobile and race to an appointment, or an entertainment.

There is little peace or satisfaction in our speed.

An English woman, writing long ago, saw what was happening to us. "Surely," she said, "all other leisure is hurry compared with a sunny walk through the fields . . . as such walks used to be in those old leisurely times . . . Leisure is gone – gone where the spinning-wheels are gone, and the pack-horses, and the slow wagons, and the peddlers . . . Ingenious philosophers tell you, perhaps, that the great work of the steam-engine is to create leisure for mankind. Do not believe them: it only creates a vacuum for eager thought to rush in. Even idleness is eager now – eager for amusement . . . Old Leisure . . . was a comtemplative, rather stout gentleman, of excellent digestion, – of quiet perceptions, undiseased by hypothesis . . . He lived chiefly in the country . . . and was fond of sauntering by the fruit-tree wall, and scenting the apricots when they were warmed by the morning sunshine, or of sheltering himself under the orchard boughs at noon, when the summer pears were falling."

You and I can't go back to that – it was gone when George Eliot wrote *Adam Bede* in 1858 – but we can spend some quiet hours in a garden, in rewarding toil, in contemplation. In using our hands, in working with the soil and the trees and the plants, we can even discover a faint trace of the genuine flavor of Old Leisure, sometimes called Peace.

1972

Membership Roster

DENVER BOTANIC GARDENS

(As of April 1, 1972)

Abbot, Mrs. C. B.
Abbott, Mr. & Mrs. David
Abegg, Chenia A., Jr.
Ackerman, Mrs. Theron L.
Adams, Mrs. B. L.
Adams, Frederick A.
Adams, Mrs. J. Loren
Adams, Mrs. Louise W.
Adams, Mrs. Ronald Burton
Adamson, Mrs. Glenn
Ahrens, Mr. Thomas P.
Aikawa, Mrs. J. K.
Ainbinder, Mr. & Mrs. Howard
Aitken, Mrs. L. L.
Albrecht, Pam
Alden, Holly
Alden, Mrs. Lee H., Jr.
Alexander, Mr. & Mrs. Bruce
Alexander, Mrs. Marion I.
Alexander, P. K., Jr.
Aley, Mrs. Maxwell
Allen, Mrs. James W.
Allen, Mrs. John T., Jr.
Allen, Nancy J.
Allen, Richard
Alm, Elmer A.
Allman, Jacqueline L.
Alm, Elmer A.
Almquist, Mrs. C. A.
Altvater, Mrs. F. V.
Alyea, Shirelle
Ambler, Mrs. John
Ammons, Mrs. Davis
Anderson, Clark L.
Anderson, Mrs. Martin E., Jr.
Anderson, Mrs. R. T., Jr.
Anderson, Mrs. Truman E.
Andrews, Mr. & Mrs. E. Wm.
Anschicks, Mrs. R.
Anschutz, Mrs. Philip
Archer, Mrs. Philip G.
Armstrong, Mrs. J. L.
Arndt, Dr. Karl
Arneill, Mrs. James R., Jr.
Arnold, Mrs. C. O.
Arps, Louisa Ward
Artisan, Robert
Ash, Mr. & Mrs. Walter B.
Ashby, Mr. Harry
Atchison, Mrs. A. P.
Aurand, Mrs. Harry
Austin, Mr. & Mrs. H. Greg
Austin, Mrs. J. E.
Bagley, Miss Alice
Bailey, Dr. Alfred M.
Bailey, Mrs. Mary
Bailey, Mrs. Richard H.
Baily, Mr. & Mrs. Jesse S.
Bain, Mrs. Francis M.
Baird, Mrs. R. N.
Baker, Augusta
Baker, Charles
Baker, Mr. Clovis G.
Baldner, Lindsay
Baldwin, Rainbow Byrd
Ballard, Mrs. R. W.
Bane, Mrs. William N.
Banks, Esther L.
Banks, Michael Jack
Barcager, Caroline P.
Barkley, Mrs. R. A.
Barnard, Dr. H. I.
Barnett, Mr. & Mrs. Douglas E.
Barnhart, Mrs. Woodson
Barron, Wm. & Jennifer
Barsotti, David
Bartels, Mr. & Mrs. John
Barton, Dr. & Mrs. M. D.
Barnwell, M. Jones
Barone, Charles P.
Barrett, Marjorie
Barron, Mrs. Arch
Barry, Gail N.
Barsis, Albrecht P.
Bates, Sybil D.
Baude, Mrs. Hugh K.
Bauer, Mr. Max
Beam, Mrs. Orville
Beardsley, Mrs. H. H.
Bechtold, Mrs. Lemoine J.
Beck, Clara A.
Becker, Mrs. R. C.
Becker, Mrs. H. C.
Becker, Ralph W.
Behrent, Mrs. Robert V.
Beidleman, Dr. Richard G.
Bekins, Mrs. Barry
Bell, Peggy
Bellomy, Ronald D.
Benjamin, Hertha F.
Bennett, Florence M.
Bennett, Mrs. Melba R.
Benton, Mr. & Mrs. A. E.
Benton, Mrs. Field C.
Berend, Arlene M.
Bergkamp, Mrs. Harold E.
Berlin, George A.
Berryman, Cora Ann
Berman, Mr. Harry
Best, Mrs. Imogene Spencer
Betcone, Barbara
Bezzerides, Mrs. T. L.
Billings
Birkenmayer, Mrs. A. B.
Birrell, Mr. & Mrs. James R.
Bivans, Miss Margaret
Black, Dr. & Mrs. William C.
Blackwell, Mrs. Lyman
Blanchard, Mr. & Mrs. Robert

Blaney, Dr. L. F.
Blank, Mr. Paul
Blanz, Mr. & Mrs. Ralph
Blecha, Mrs. Harry
Bledsoe, Mrs. Henry A.
Blickensiderfer, James C.
Blizard, Sandra
Bloch, Mrs. Don
Block, Dr. & Mrs. Wm. A.
Blount, Gail H.
Bobal, Anne T.
Bock, Dr. Jane H.
Boettner, Mrs. J. L.
Bogart, Sophia S.
Boggess, Bruce H.
Boggess, Mrs. Scott
Boline, Mrs. E. A.
Bolinger, Maxine I.
Bollig, Mrs. Joseph
Bonnie, Marjorie I.
Boone, Mrs. Merrill C.
Booth, Mr. Lanny R.
Borgen, Mrs. Bjorn K.
Borwick, Mrs. Charles
Boston, Mary V.
Bosworth, Richard H.
Bosworth, Mrs. Robert G.
Bottorff, Richard L.
Bouck, Miss Polly
Bourishaw, Fran
Bouslog, Dr. John S.
Bowen, Dr. & Mrs. James L.
Bowers, Miss Eva F.
Bowes, Mrs. Watson
Bowlby, Mrs. Robert Alan
Bowman, Mrs. Jim
Boyd, Mrs. Gary D.
Boyer, Mrs. Barbara S.
Boyle, Dr. & Mrs. Richard E.
Bozarth, Mrs. Howard, Jr.
Brace, Mr. & Mrs. Robert
Braden, Mrs. John W.
Bradford, Mrs. William E.
Bradley, Mr. & Mrs. Vester C.
Bramley, Mrs. Howard
Brandeberg, Mary Lou
Brennan, Mr. M. G.
Bray, Janet E.
Brewster, Rodman, Mrs.
Bridges, Dr. James H.
Bridges, Wm. G.
Briesemeister, Ethel
Brimmer, Mr. & Mrs. Wm. N.
Brink, Dr. Kenneth M.
Brittingham, Ruth W.
Brock, L.
Brock, Mrs. Sidney L., Jr.
Brock, Mrs. Wadsworth
Brodie, Mrs. Joan
Bromfield, Mr. A. J.
Bromfield, Mrs. Helen P.
Bromfield, Mrs. Lawrence
Bromfield, Mrs. M. C., Jr.
Brooks, Mrs. John, Jr.
Broughton, Mrs. Joseph
Brower, Virginia R.
Brown, Mrs. Alden H.
Brown, Ann B.
Brown, Mr. C. A.
Brown, Donald F.
Brown, Mrs. F. O.
Brown, Mrs. Gilbert L.
Brown, John S., III
Brown, Mrs. Macintosh
Brown, Mrs. Ruth H.
Brown, Dr. William R.
Bruderlin, Mr. Emil J.
Bruesselbach, Karl
Bruhn, Mr. & Mrs. Herbert A.
Brunkhorst, Mr. H. J.
Brunquist, Dr. E. H.
Bruns, Mrs. Robert L.
Brunson, Thayer
Bryant, Bruce
Buchan, Mrs. Mcintosh K.
Buchanan, Mrs. Robert
Buchanan, Mrs. Carolyn
Bucher, Mrs. Lawrence H.
Buck, Mr. & Mrs. Arnold F.
Buck, Douglas
Bucknam, Robert C.
Bullard, Mrs. Nell
Burgess, Mrs. Ralph
Burke, Edward F., Jr.
Burke, Mrs. Kenneth
Burket, Mrs. J. Warren, Sr.
Burkhardt, Mrs. William
Burnett, Mr. Emery
Burnkrant, Richard A.
Burns, Mr. & Mrs. Hugh
Burns, Mrs. Robert R.
Burnside, B. J.
Busch, Kathleen
Burt, Mrs. Claude
Burt, Mrs. Harvey A.
Burton, Sherry
Buschman, R. G.
Butler, Mr. & Mrs. David
Butts, Mrs. Louise

Caldwell, Elvin R.
Calloway, Mrs. Roy E.
Calvert, Mrs. F. W.
Camp, Richard A.
Campbell, Mrs. Donald C.
Campbell, William A., M.D.
Canaday, Mr. & Mrs. Jerome B.
Cann, Mrs. John R.
Cannon, Mrs. George R.
Cannon, Kathleen A.
Canon, Mrs. George M.
Caperton, Mr. Harry O.
Capps, Fred M.
Carlson, Mrs. Delbert L.
Carlson, Mr. Jim
Carmeny, Miss Lily V.
Carney, Mrs. J. G.
Carpenter, Mrs. Farrington
Carpenter, Joseph F.
Carpenter, Mrs. Virginia K.
Carr, Mrs. L. A.
Carroll, Mrs. John E.
Carson, Mr. & Mrs. J. Nevin
Carson, Mrs. Thomas
Carswell, Frances G.
Carter, Elmer W.
Carter, William J.
Cary, Mrs. Ward E.
Casey, Mr. & Mrs. George S.
Cassell, Mrs. Jeanne T.



Cassidy, Mr. & Mrs. Charles F.
Casson, Mrs. R. M.
Chaffee, Mrs. W. T.
Chaiken, Mrs. Sheldon A.
Chandler, Dr. Earl
Chandler, Polly
Chapman, Mrs. Thomas
Chappell, Mrs. Delos
Chappell, Miss Lori
Chappel, Mrs. Pierre
Chaput, Arthur F.
Charles, Mrs. Michael
Cherne, Mrs. Howard R.
Chilcote, Katherine V.
Child, Dean H.
Childs, Mrs. S. B., Jr.
Chlevin, Benjamin J., Jr.
Choitz, Mrs. Marcel P.
Christensen, Mrs. C. J.
Christensen, Mrs. D. L.
Christy, Mrs. Gary
Ciancio, Joe, Jr.
Clark, Henry B.
Clark, Mrs. Mary
Claiborne, Ralph
Clawson, Mr. & Mrs. Robert M.
Clayton, Mrs. Glenn
Clayton, Mrs. Mack L.

Clements, Ellis C.
Clements, Ruby M.
Clifford, Mrs. William
Cline, Mr. Everett L.
Clinton, Robert
Close, Mrs. Harland T.
Cluphf, Mrs. Harlan E.
Clymer, George
Cody, Mrs. Edward L.
Coe, John Clark
Coffey, Mrs. Vernon B.
Cohen, Mrs. Alvin L.
Cohen, Mrs. M. C.
Cohn, Mr. & Mrs. Johann
Cole, Agnes B.
Collier, Mr. T. R.
Collins, Mr. & Mrs. Dabney Otis
Collins, Mrs. S. H.
Collister, Mrs. Em. B.
Colson, Miriam
Cone, Lt. Col. & Mrs. Leo F.
Congdon, Edwin A.
Connelly, Mrs. Jane E.
Connor, Mr. & Mrs. Jon J.
Connor, Wm. Jos., Jr.
Conover, Mrs. Frederic K.
Conover, Mrs. Josephine L.
Conrad, Mr. Henry J.
Cook, Mr. & Mrs. C. F.
Cook, Mrs. Edward
Cook, Mrs. J. R.
Cook, Mrs. Wm. L.
Cooper, Mrs. Richard H.
Conrad, Mrs. J. S.
Cosgriff, Mrs. T. A.
Cottingham, Mr. & Mrs. D. A.
Cotton, Mr. A. B.
Council, Mrs. Joann
Cox, Mrs. Harold H.
Cox, James C.
Cox, Joy W.
Coyle, Mrs. Sam D.
Craddock, Jean
Crain, Mrs. Richard P.
Crawford, Miss Caroline
Creighton, Mrs. Thomas E.
Cressaty, Miss Margaret
Crews, Mrs. William
Crisp, Mrs. Katharine B.
Crissey, Miss Lucy M.
Cross, Gwendolyn E.
Crouse, H. E.
Cullen, Mrs. Gerald B.
Culver, Mrs. Donald M.
Currier, Mrs. Laurence
Curry, Maj. Gen. John F.
Cusic, Kathleen
Cuthbert, Mrs. Warren

Daley, Mrs. Edith M.
Damrauer, Lenore
Danielson, Ralph W.
Darby, Mr. & Mrs. Paul T.
Davidson, Leila Webb
Davidson, Mrs. S. Mark
Davis, Tessa & Alan
Davis, Mrs. Allen H.
Davis, Mrs. C. Earl
Davis, Mr. & Mrs. J. S.
Davis, Mrs. John C., III
Davis, Mrs. Mary Lou
Davis, Dr. & Mrs. M. H.
Davis, Mel W.
Davis, Mr. & Mrs. Richard M.
Davis, Mrs. Robert L.
Davis, Dr. & Mrs. W. Grayburn
Davis, Mr. & Mrs. Wesley E.
Davis, Mr. & Mrs. William
Davison, Mr. & Mrs. Robt. P.
Dawson, Mrs. J. C.
Deason, Mrs. Joe D.
Decker, Mr. & Mrs. Martin G.
Delaney, Mrs. James
Delong, Sara S.
Deluise, Mrs. Piero
Delzer, Rollin
Denning, Thomas J.
Detemple, Carl N.
Deterding, Mrs. Alva
Devlin, Linda
Devries, Walter
De Yoanna, Mr. & Mrs. Thomas
Dicarlo, Robert H.
Diehl, Mrs. Vallarie
Dieter, Mr. Walter W.
Dietler, Mrs. C. S.
Diggs, Mr. Walter F.
Dillavou, Mr. J. E.
Dines, Mr. & Mrs. Bruce E.
Dines, Mrs. Eugene, Sr.
Dings, Mcclelland G.
Diss, Mrs. Alexandra G.
Dixon, Mrs. John H.
Dlugolecki, Mr. Leon
Doan, H. W., M.D.
Dobbins, Mr. & Mrs. Chris
Dobbs, Mrs. Finis E.
Dodds, Miss Mary A.
Dodson, A. F.
Doherty, Elizabeth B.
Dolan, Mrs. J. F.
Dolan, Mr. Lawrence
Dominick, Jacqueline M.
Donsky, Marc A.
Dorn, Mrs. Clayton
Doty, Mrs. L.
Doty, Mrs. Philip E.
Douglas, Mrs. Frederick H.
Downing, Mary Jane
Downing, Mr. & Mrs. Richard, Jr.
Doyle, Mrs. Joe H.
Drange, Mr. Charles M.
Dragoo, Dr. & Mrs. Robert A.
Dresen, Mrs. Wm. F.
Dudler, Mrs. Randolph
Ducker, Mr. George A.
Duke, Mrs. H. Benjamin, Jr.
Dunham, Mr. & Mrs. Herbert R.
Dusenberg, Edith
Dutton, Mrs. Roger W.

Eames, Mrs. Gladys G.
Earle, Dr. W. Hubert
Earley, Mrs. Robert
Easly, Mrs. James J.
Eastland, Mr. & Mrs. O., Jr.
Eastman, Mrs. Roe
Eber, Richard
Eberhardt, Mr. & Mrs. Ernest
Eckis, Rollin C.
Edison, Mrs. E. R.
Edwards, Mr. & Mrs. William G.
Egan, Mr. & Mrs. E. D.
Eiche, Mr. E. E.
Eldridge, Geneva
Eldredge, Mrs. Patrick
Ellett, Mrs. Emerson S.
Ellis, Mrs. Catherine
Ellis, Elliot F.
Ellis, Mr. Erl H.
Ellsworth, Mrs. Ralph E.
Elmquist, Fred N.
Emerick, Miss Juanita E.
Emerson, Mrs. Edgar
Emery, Mrs. Charles
Emery, Mr. & Mrs. Roderick R.
Enoch, Judge & Mrs. David W.
Ensor, Mary
Epp, Mr. John G.
Erhard, Albert
Erisman, Mrs. R. Franklin
Ernst, Mrs. Charles H.
Esmiol, Mr. & Mrs. Morris A.
Essig, Mr. B. C.
Ethell, Mrs. F. W.
Evans, Mrs. Doris J.
Evans, Miss Edith M.
Evans, Mr. & Mrs. John
Evans, Mr. & Mrs. John M.
Evans, Miss Katherine
Ewens, Mrs. Luise L.
Ewing, Mr. & Mrs. R. A.

Fahlenkamp, Leroy C.
Fahlberg, Mrs. G. A.
Fahrney, Mrs. Dan
Fairfield, Mrs. Robert J.
Falion, Mrs. William M., III
Falkenberg, Mr. & Mrs. John F.
Falkenberg, Mr. & Mrs. Wm.
Fall, Mrs. Richard C.
Fallieros, Zoe
Farland, Mrs. Adolf
Farquhar, Miss Bucky
Farris, John L.
Faxon, Mrs. Virginia W.
Feldman, Ann Louise
Fender, Katherine A.
Fennell, Mrs. Robert H., Jr.
Ferguson, Mr. Carlisle
Ferguson, Mrs. David
Ferguson, Mrs. John A.
Feucht, Dr. James R.
Fields, Lelia
Fiori, Mrs. Robert F.
Fisher, Dr. & Mrs. Calvin
Fitzgerald, Mrs.
Fitzsimmons, Mr. Fred
Fix, Mrs. Bula
Flick, Mrs. Bruce
Flint, Mr. & Mrs. R. H.
Florman, Mrs. Bode A.
Fluck, H. G.
Folmer, Mrs. Henry
Folks, Richard
Forsberg, Robert W.
Forselius, Mrs. Randall A.
Fouts, Mrs. G.
Fowler, Mrs. J. R.
Fox, Guy
Francis, Lyle D.
Frank, Anna Lee
Frank, Mr. & Mrs. Maurice
Frankhouser, John R.
Franson, Mr. & Mrs. Herbert
Frederick, Ruth

Freeman, Mr. & Mrs. Samuel
Freer, Mrs. Mary F.
Freiheit, Mr. Clayton
Freshman, Mrs. A. W.
Freudenberg, Lt. Col. & Mrs. W.
Freyer, Mrs. Frank B., Jr.
Friesen, Edward H.
Frost, Mrs. Dayton H.
Frost, Miss Mary C.
Frush, Mrs. Georgia K.
Fry, Mrs. F. A.
Fry, Miss Florence E.
Fukuma, George
Fuller, Mrs. John W.
Fuller, Mr. & Mrs. Pierpont, Jr.

Gargel, A.
Gale, W.
Gallavan, Patrick, J.
Gallegos, Tony
Gambill, Dr. W. G., Jr.
Gant, Wilma V.
Garcia, F. A., M.D.
Gardell, John E., M.D.
Gardner, Elizabeth J.
Garfein, Dr. & Mrs. Arthur D.
Garrey, Mrs. George H.
Garstang, Mrs. Ann C.
Gaskill, Mrs. S. W.
Gast, Mrs. Robert S.
Gates, Mrs. Caleb
Gates, Mrs. Charles C.
Gaurd, Dr. & Mrs. H. L.
Gauger, G. G.
Gauss, Mrs. Elvia V.
Gaylord, Mrs. Bradley, Jr.
Gaylord, Mrs. Charles
Gebhard, Miss Minnie
Geddes, Mr. William J.
Geick, Margaret A.
Geiss, Mr. & Mrs. Andrew
Gelvin, Mrs. Ray
George, Mrs. Wm. D.
Giacomini, Mrs. D. L.
Gibson, Mr. & Mrs. George C.
Gibson, Mrs. Jess
Gilbert, Beatrice T., M.D.
Gilbert, Mr. & Mrs. Richard K.
Gilbert, Mrs. S. H., Jr.
Gilcrest, Mr. I. D.
Gildea, Geraldine Mrs.
Gill, Mr. & Mrs. Lawrence
Givan, David Allen
Gittings, Mr. & Mrs. Richard S.
Glassburn, Dr. A. R., Jr.
Glassford, Walker
Goehring, Lewis
Goes, Nancy K.
Goldman, Ms. Ronnie
Goldman, Mr. & Mrs. Edward
Goldsby, Fred L.
Goldy, Mrs. H. Donald
Gomez, Mrs. R. A.
Goodin, Phillip Eugene
Gordon, Mrs. Charles P.
Gordon, C. V.
Goldstein, Lynn M.
Goss, Mrs. Douglas K.
Gottschalk, Dr. & Mrs. Robert
Graham, Mr. Robert S.
Granicher, Mrs. Donald I.
Grant, Mrs. William W.
Grant, Mrs. Wm. W., III
Gray, Mrs. Richard E.
Grebe, Mrs. Frances
Green, Mr. & Mrs. Dudley
Green, Elenor
Greines, Harriet
Grey, Mrs. Schuyler E.
Griffin, Mrs. Hugh
Griffith, Mrs. Wm. M.
Grill, Leo F.
Grimes, Mr. & Mrs. George L.
Griswold, Mrs. Lester E.
Gross, Mrs. Benjamin
Grover, Dr. Robert F.
Groves, Mrs. William B.
Grow, Dr. & Mrs. John
Grutter, Mrs. Walter
Grynberg, Mr. & Mrs. J.
Guilfoyle, E. J.
Gump, Mr. & Mrs. M. L.
Gurian, Mr. & Mrs. Dan
Gurtler, Mrs. Arnold
Gushurst, Teresa

Hacker, Mr. & Mrs. E.
Hackstaff, A. T.
Hackstaff, Mrs. J. Edward
Hackstaff, Mrs. Howard L.
Hagemeister, Miss Jo Ann
Hahn, Lona F.
Hall, Mrs. Laurence B.
Halmi, Mrs. C. Z.
Halpenny, Ruth W.
Halpin, Mrs. Stephen J.
Hames, Kathleen
Haman, Mr. Seman
Hames, Mr. & Mrs. Eugene S.
Hamilton, Mrs. Frederick C.
Hamilton, Mrs. W. L.
Hammond, Mrs. Stanley
Hampton, Mr. & Mrs. Orville W.
Hannigan, Mr. R. S.
Hannum, John, M.D.
Hansen, Mr. & Mrs. Claude B.
Hansen, Jack
Hanson, Bruce G.
Hanson, Mrs. Fredrick R.
Hanson, Lynn S.
Hanson, Virginia D.
Hanson, Walter E.
Hardin, Mrs. Sam B.
Hargreaves, Col. R. B.
Harlan, Mr. & Mrs. Donal L.
Harley, Mr. Wynne
Harper, Mrs. Fred
Harper, Mrs. John S.
Harris, Mr. & Mrs. D. Carl
Harris, Mrs. J. A.
Harris, Mrs. J. Mel
Harrison, Mrs. Charles
Harrison, Mrs. R. J.
Hart, Mrs. John L. J.
Hart, Mr. & Mrs. John N.
Hartman, R. E.
Haskell, Mrs. Charles A.
Hatch, Gladys J.
Hatcher, Mrs. Hugh
Hattendorf, Mrs. N. E.
Hauck, Miss Rachael
Hauck, Earl & Patricia
Hawkins, Mr. & Mrs. Horace N
Hawkins, Ruth
Hawthorne, Rowland
Hay, Judy
Hayden, Mr. & Mrs. George K.
Haydon, Mrs. George V.
Hayes, Kenneth & Glenda
Hayna, Lois B.
Hays, Mrs. William H.
Hayward, Glenn C.
Hayward, Mrs. Phil
Hazen, Mrs. Wayne C.
Heacock, Mrs. Mary Ann
Hearn, Mrs. L. E.
Hechter, Natalie
Heckman, Miss Dorothy A.
Hedrick, Mr. Robert R.
Heidtbrink, Ed
Heinschel, Mrs. Phil
Heinz, David
Heisel, Laura Jean
Heitzmann, R.
Helper, John W.
Henderson, Barbara Jean
Hennessey, Mr. & Mrs. R.
Henry, Mrs. Hubert D.
Hentzell, Paul A.
Herbert, Mrs. Thomas G.
Herbst, Mr. & Mrs. Hal
Herfurth, Mr. & Mrs. Carl E.
Hermann, Dr. & Mrs. A. A.
Hermann, Dr. & Mrs. Gilbert
Herrgott, Mrs. Francine B.
Herring, Mrs. Carrie
Herrington, Mrs. Cass M.
Hershner, Mr. John D.
Hess, Dr. Dexter W.
Hewitt, Charles H.
Hickey, Mrs. Frand E.
Hicks, Mrs. S. Nelson
Hieronymas, Mrs. R. E.
Higbie, Mrs. H. G.
Higbie, Mr. Harley G.
Highland, Mr. & Mrs. Sam
Hildreth, Dr. A. C.
Hill, Dr. & Mrs. George J., Jr.
Hill, Hazel T.
Hill, Susan A.
Hill, Mrs. W. J.
Hilliard, Mrs. E. H., Jr.
Hillyard, Mr. & Mrs. Gerald R.
Hilton, Robert J., M.D.
Hinds, Mrs. Ervin A.
Hiner, Mrs. A. W., III
Hines, Mr. C. Leigh
Hoch, Dr. & Mrs. P. C.
Hodgson, Mrs. Donald R.
Hofen, Mr. Russell
Hoffman, William
Hogsett, Mrs. V. H.
Holland, Mrs. Josiah G.
Holland, Mrs. William Y.
Hollendorfer, Fred & Cathy
Hollis, Mrs. Gordon
Hollister, Mrs. Elizabeth
Holman, Erwin W.
Holme, Mr. & Mrs. Peter H.
Holmes, Mrs. Hardin
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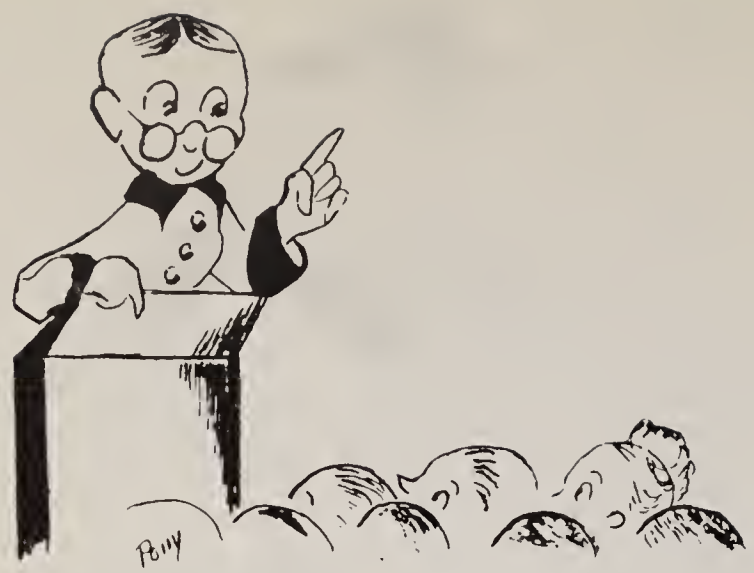


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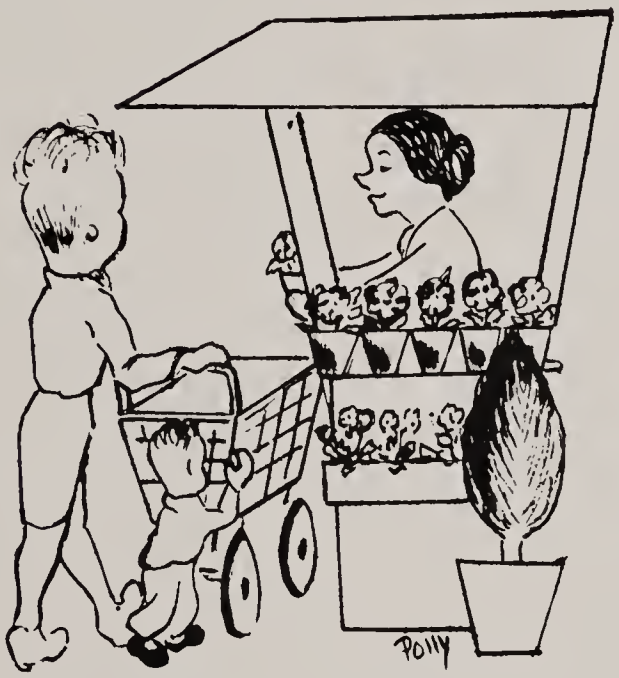
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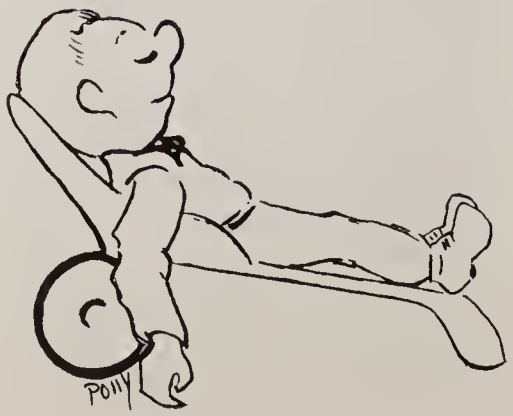
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DENVER, COLORADO

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A botanic garden is a collection of growing plants, the primary purpose of which is the advancement and diffusion of botanical knowledge. This purpose may be accomplished in a number of different ways with the particular placing of emphasis on different departments of biological science.

The scientific and educational work of a botanical garden centers around the one important and essential problem of maintaining a collection of living plants, both native and exotic, with the end purpose of acquisition and dissemination of botanical knowledge.

The Green Thumb

VOL. 29, NO. 4 AUTUMN, 1972



THE COVER

Tomorrow's Horticulturists In the Conservatory

Photo by Loraine Yeatts

THE GREEN THUMB

VOL. TWENTY-NINE, NUMBER FOUR

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WES WOODWARD–EDITOR

AUTUMN, 1972

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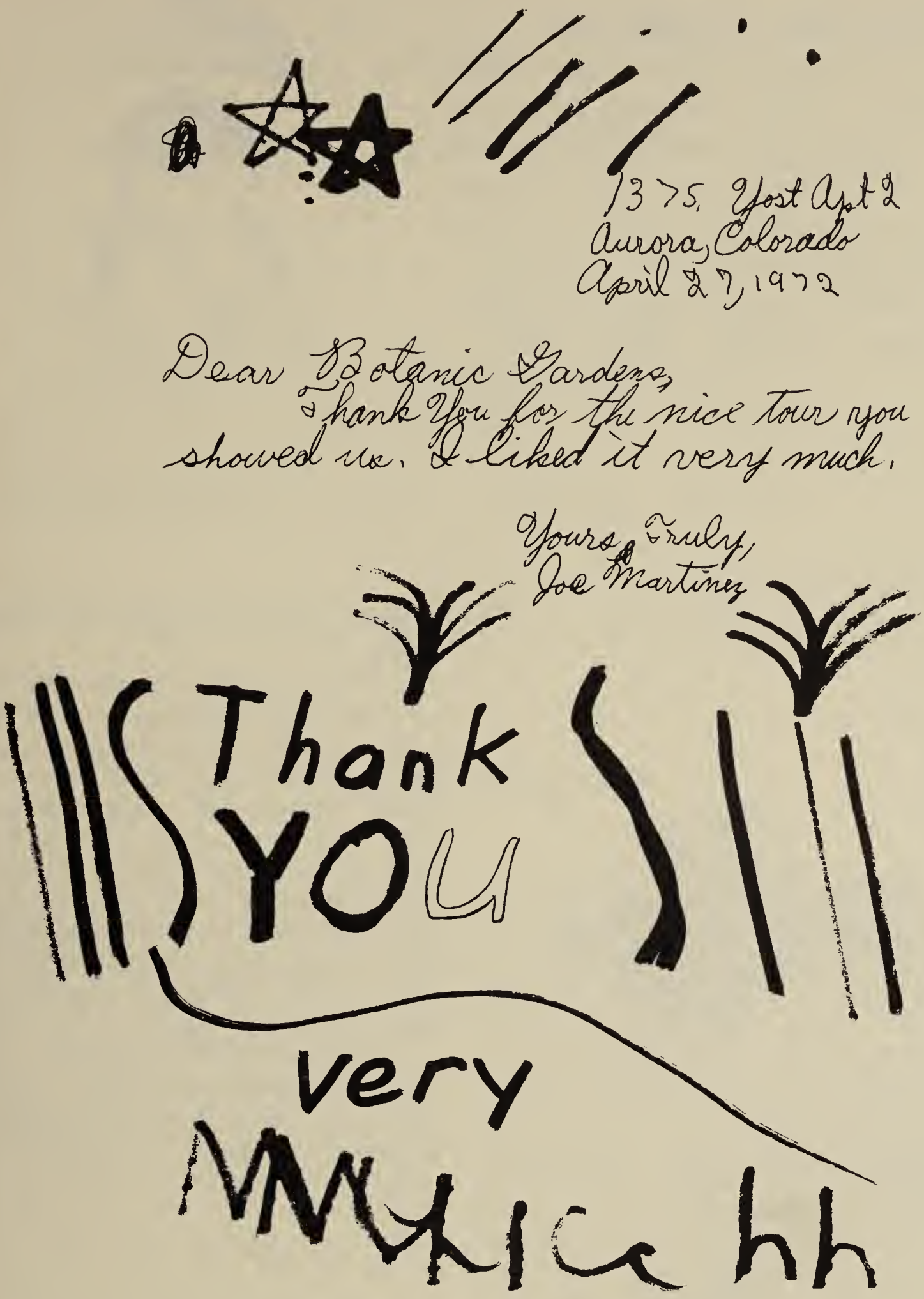
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Ohhh - - - look at that!

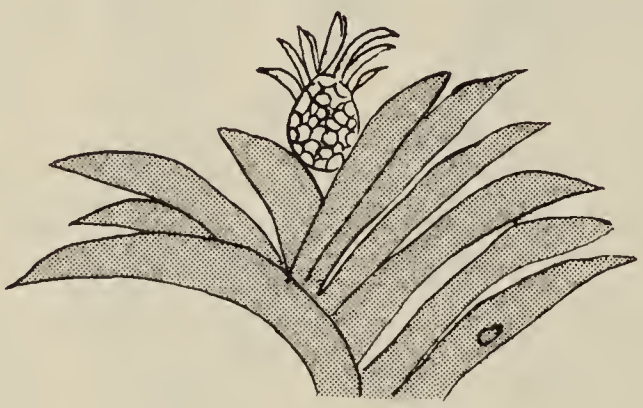


In the first six months of 1972 more than 8,100 children went on guided tours of the Boettcher Conservatory at Denver Botanic Gardens. Denver public schools sent 2,410 students; Jefferson County schools 3,140. There were 1,797 children from the schools of other counties, 501 from high schools, and 338 from parochial schools. All these visitors made their tours under the expert care of the 27 conservatory guides who each contributed an average of two hours a week to the job. It figures out that, on the average, each guide conducted over 300 children through the conservatory during the six-month period.

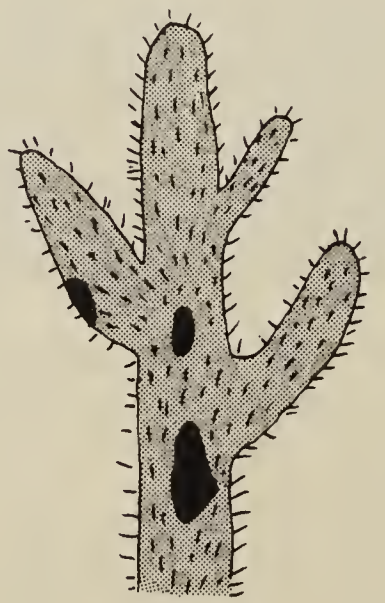
Dear Mrs. Middleton,
I enjoyed the tour you took us on. I had lot of fun, but it would be better if you got a roof that opens up because it is to hot in there, but I want to thank you anyway. I wish I could come back to Botanic Gardens. Thank you.
Love Gloria Gonzales



pine-apple plant



cactus maybe has a desiz



There aren't enough guides to meet the demand.

In addition to the 8,100 school children who toured the conservatory, there were 1,600 more in adult garden groups, convention groups, and others, who were guided through the tropical wonders. Some groups, including scouts and the very young school children, as well as adults, made the tours without guides. There were over 3,100 of these people. By the middle of March the schedule for tours in late April and May (one group every hour) was booked solid. The record shows that 12,918 persons went on the scheduled tours during the first six months of this year. Thousands of others, not scheduled, visited the conservatory.

* * *

Volunteers who wish to become conservatory guides go through a six-week training course. In July, 16 new volunteers were attending classes taught by Mrs. Phil Hayward for two hours each week. Upon completion of the course the guides are expected to donate at least two hours a week to the conservatory tours. Those interested may get in touch with Mrs. Hayward, Syd Glick, or Margaret Sikes.

April 28, 1972

Dear Guide,

I sure did like the tour.

I liked the plants.

Well I guess I had better be going now by

Love Becky Bryan

A TOUR GUIDE TELLS ALL

Syd Glick

I was sure I never could learn all those Latin names! Even the common names of all those foreign tropicals surely would never come to mind if I had a staring horde of 10 or 12 year olds before me. No, I couldn't possibly be a guide!

But, oh, here was someone actually willing to take me into the tropical wonderland and tell me about all those fascinating big-leaved plants and beautiful blooms! One tour through the conservatory and I was hooked; one training session and I was eager for next week to come so I could be introduced to yet another family from the plant kingdom and hear more details about the strange and often incredible inhabitants of the hot, wet quarters of our planet. Here was someone willing to initiate me into the wonders of plants bearing exotic fruits and fragrances, giving sustenance to natives of the jungle wilds, providing medicines and fibers, construction materials and even cosmetics!

I'm still sure I'll never know most of those Latin names. The school children don't care. When I show them a tree that grows in Australia to be over 200 feet tall and twelve feet across, their eyes widen with amazement. When I point out the pineapple-like plants and the orchids festooned on the tree trunks or point to the huge green fronds of the feather-palms, they are transported by magic to the depths of a tropical rain forest. When I describe the fierce battle between the tree-climbing fern and our little jelly palm, they feel sympathy for the barely surviving palm and perhaps realize more acutely that plants too compete to survive. I show them bananas, and even tomatoes that grow on trees. Perhaps the children go home feeling a little more of the diversity and wonder and excitement of the world of plants. Perhaps they become more attuned to an aspect of nature that most of them hardly considered before. It is a rewarding experience for me just to share an hour during which their worlds expand.



Codiaeum variegatum

Colorful plants admired by visitors to the Conservatory

FOCUS on

Codiaeum variegatum

in the
Boettcher Memorial Conservatory

Peg Hayward

Codiaeum variegatum (L) Blume, originally from the South Sea Islands, is the scientific name for croton, an ornamental tropical shrub. The word "croton" is wrong botanically for it belongs to an entirely different group of plants of the same family, *Euphorbiaceae.* The genus *Croton* is the source of croton oil used medicinally, but of no particular garden value. Croton is from the Greek *kroton* for a tick, also a plant having tick-like seeds.

Codiaeums are favorite foliage plants with permanently colored leaves which are grown in warm, moist climates and valued for cultivation in greenhouses. *Codiaeum* is derived from the Greek word for head; the leaves were used for making wreaths. These woody shrubs may reach a height of 12 feet, but are usually kept much lower. The art of the hybridizer has given an ever-increasing number of varieties. The leaves have unlimited variations in form and in color pattern. Leaf blades may be either entire or lobed. Some varieties have long, narrow leaves while others are broad and laurel-like. Many leaves are smooth, others wrinkled, and some are twisted cork-screw fashion. All are thick, short stemmed and from 3 to 10 inches long. Leaves are strikingly mottled in brilliant colors ranging from green to yellow, orange-pink, red, maroon, or bronze. The color appears in spots, blotches, marginal colorings, and veins often show contrasting colors. Many crotons have young growth of one color that matures to quite another. Very seldom will two leaves on any plant be exactly alike. Crotons are sun-lovers and never show their best coloration in wet, shaded spots. When strongly shaded, the leaves turn green and may lose their colored patterns altogether.

Small monosexual flowers appear in axils of upper leaves in narrow spikes 6 to 10 inches long but are inconspicuous compared with the showy leaves. Male flowers near the top of the plant are white, each with 15 or more stamens. Female flowers below develop into small, globose, three-parted green fruits.

Codiaeum seeds do not come true, so propagation is by cuttings of half-ripened shoots under warm and close conditions. Substantial young plants may be secured from old specimens by air-layering well-colored tops.

Most of the many named varieties in cultivation are considered to have originated as seedling forms or sports of *C. variegatum* var. *pictum* (Lodd.) and are widely distributed throughout the tropics. Specialists have given fancy names to many of the more attractive varieties. Many "best ten" could be selected and the following are mentioned as just a few good examples: Lord Derby, large lobed leaves, yellow with bright red suffusion; Indian blanket, green, blotched with red and yellow; Bermuda red, with nearly all red smoothly pointed leaves; Mrs. Iceton, dark red with rose mottlings; and Masterpiece with twisted leaves in red, green and yellow. The bright colored foliage of the cultivated forms is conspicuous and plants massed in clumps make a dazzling exhibit.

BARTRAM'S GARDEN

Avalonne Kosanke

"This is a very ancient garden, and the collection is large indeed... It is finely situated, as it partakes of every kind of soil, has a fine stream of water, and an artificial pond, where he has a good collection of aquatic plants. There is no situation in which plants or trees are found but that they may be propagated here in one that is similar." Thus did Reverend Manassa Cutler's JOURNAL describe the Bartram garden at Kingsessing, near Philadelphia, Pennsylvania, as it existed fifty-five years after it was begun. How much more ancient now! The collection is not so large, however, and intervening years have not always been kind to America's oldest existing botanic garden.

John Bartram had no intention of establishing a botanic garden. He was simply a farmer. In 1728, to provide for his rapidly growing family, he purchased at sheriff's sale 112½ acres of land sloping down to the Schuylkill River. An orchard and house came with the land. The orchard provided Bartram's favorite beverage, cider, and visitors today may examine the cider mill and press he carved from stone near the river's edge. The kitchen of the original house may still be seen as part of the handsome gray stone structure which Bartram built. Its datestone reads "John - Ann Bartram 1731."

Perfect Order and Regularity

His skill as stonemason is evidenced in many unusual uses of stone still visible in the seedhouse, also used as a greenhouse, and other buildings. He wrote of this work to friends. "I have been used to making steps, door-sills and large window cases, all of stone, and pig troughs and water troughs. I have split rocks seventeen feet long and built four houses of hewn stone split out of the rock with my own hands."

Unusually perceptive of natural laws, Bartram farmed his land. With laborious care he poured back onto his fields the swamp muck, manure and other composts he concocted with such results that he regularly harvested more than thirty bushels of wheat per acre compared to his neighbors' ten. Other crops were similarly superior. By 1740 he owned nearly 300 acres. Crevecour wrote of the farm, "Every disposition of the fields, fences and trees seemed to bear the marks of perfect order and regularity which in rural affairs, always indicates a prosperous industry."

Yet somehow his success as a farmer was never enough for John Bartram. He

was born of Quaker parents at Darby, Penns., in 1699. He had learned the rudiments of reading, writing and arithmetic at the Friends' School in Darby. Beyond that he was self taught, a natural student, one driven by an insatiable curiosity, especially about plants. He wrote, "I had always since ten years old, a great inclination to plants, and knew all that I once observed, though not by their proper names, having no person nor books to instruct me." He bought what books he could afford and borrowed others on history, art, science, philosophy and several languages. He was drawn to "physic" and surgery, based largely at that time on medicines derived from herbs. This stimulated his interest in plants, and he frequently visited the medicinal herb garden of his friend, Christopher Witt, physician.

A Genius for Botany

This study of plants was further encouraged by James Logan, Secretary to William Penn. Logan was a serious student of plants and gardening. His library on this subject was one of the finest in the colonies. "Paradiso in Soli" written by John Parkinson in 1629, was one of many books he loaned to Bartram. In 1729 Logan wrote to an English friend, "Please procure me a Parkinson's Herbal; I shall make it a present to a person worthy of a heavier purse than fortune has yet allowed him. John Bartram has a genius perfectly well turned for botany."

True! The plants of his farm and neighboring lands were quickly known to him. Soon he was traveling by foot and by horseback into Maryland, New Jersey, New York and beyond. His saddlebags bulged with new and curious plants to be grown and observed in his garden at Kingsessing. Sometimes his sons went with him. Most often he traveled alone for the trips were strenuous. Once he covered 1100 miles in five weeks.

It was a costly, time consuming hobby. In his increasing absences much of the farm management fell to loyal servants. Such profitless endeavor was frowned upon by his wife, Ann Bartram.



John Bartram's House

This photo and the photo on Page 119 are from the publication, "John Bartram, His Garden and His House", by The John Bartram Association.

How provident when Joseph Breitnall, a Philadelphia merchant, introduced Bartram by letter to the London merchant, Peter Collinson. Quaker Collinson had one consuming passion, his ornamental garden. He desired plants from the new world. Bartram was certainly qualified to supply them. Their cautious business agreement grew quickly into a reciprocal trading friendship that spanned thirty-five years and nearly doubled the number of ornamental plants grown in England.

More Honor Than Profit

Other wealthy patrons clamored for a share of the findings of this American botanist. At one time nearly fifty subscribed to the fund which made his searches almost self-supporting. Collinson's greatest coup for Bartram came in 1765 when he wrote, "This day I have received certain intelligence from our gracious king (George III) that he has appointed thee his botanist with a salary of 50 pounds a year." It proved more honor than profit since it required a horse which cost much while such mundane items as freight expenses for shipments remained ignored.

For years few ships left Delaware for England without a box from Bartram. Of his eleven children, William became most involved in care of the garden and making ready the shipments of seeds, roots and plants for patrons and the specially prepared specimens for study by European botanists, including Carolus Linnaeus. Almost from the beginning, the boxes included shells, turtles, frogs, rocks and similar objects since Collinson had written, "Every uncommon thing thou finds in any branch of nature will be acceptable."

Besides his stipend, Bartram received many things from Collinson: books on many subjects, fine wool cloth for Ann, advice, encouragement and requests. More exciting, however, was the endless stream of English and European seeds and plants to be tried in the Bartram garden. One box contained the roots of "Siberian rhubarb," recently from Russia, with instructions how to prepare its stalks for eating. In 1743 came special pear seeds from former Patron Lord Petre's widow. Planted near the house, the famous Lady Petre pear tree took twenty years to bear fruit—but lived till the very dry summer of 1931!

Increased demands for new plants plus his own unabated curiosity beckoned Bartram on ever more arduous collecting trips. As the King's Botanist he undertook the exploration of Florida's east coast and St. John's River in 1765. His son, William, accompanied him on the eight month journey. Together they saw for the first time the famous and elusive *Franklinia alatamaha.* The trip was a fitting climax to his travels.

A Practical Garden

The garden at Kingsessing was unique from its beginning. America's 18th century gardens had not evolved into the colorful, strictly-for-pleasure borders of today. They were, like their times, more practical. They provided shade in lieu of air conditioning, food for the table, preserves for the pantry, herbs for the kitchen and medicine. Certainly Bartram's garden defied the rules and existed solely for the study and propagation of his treasured plants.

It boggles the imagination to picture the Bartram assemblage of things collected. It was easily the most extensive botanical collection in America, some "2000 native species contained in the

space of six acres" as recorded by the Pennsylvania Horticultural Society. There were also rare foreign plants gathered from gardens around the world. Manassa stated there was no situation in which plants were found but that it might be duplicated in Bartram's garden. This was not happenstance. It proved his uncanny ability to observe accurately a plant's exposure, soil, light and moisture needs where it was gathered. The goal of his garden was to re-create these optimum growing conditions for each plant. This precluded growing them according to some formal plan, or even isolating them in botanically related groups. The gerrymandering of ecologically similar plantings resulted in a disorderly order which few visitors could comprehend. It also discourages those who seek now to restore the garden.

During the American Revolution, with battlefields near at hand, it is to the credit of the British that though they occupied his house, they did nothing to destroy the garden around which he had centered his life. John Bartram's death came quietly in 1777 when the newly formed country was barely one year old.

William Bartram, by then a recognized artist, naturalist and botanist, continued the collecting and garden-nursery with the help of his own son, John. It was 1850 when the thirty-five acres which included the aging garden passed from the Bartram family control.

John Bartram Association

The twenty-seven acres which now comprise Bartram's Garden were purchased for a park by the City of Philadelphia in 1891. Two years later about 400 of his descendents formed the John Bartram Association "which maintained an interest in the care of the property." Thus ended the more than forty year



Large specimen of *Halesia Tetraptera* (Silver Bell) in Bartram's Garden

period of depredation by neglect and plant hunters.

Restoration moved slowly. In 1923, concerned citizens persuaded the association to open its membership. Paid memberships and specially raised funds speeded repair of buildings and replacement of walkways. A serious study of the garden's original plantings revealed only eighty-two of those listed by Thomas Meehan, gardener, in 1853. The present guideline for replanting is based on the list culled from Bartram's records of what he grew there. The original garden area, which includes the house, is reserved for plants known to have been grown by either John or William Bartram.

The visitor may speculate whether or not John Bartram actually planted the ancient yellow-wood, *Cladrastis lutea,* a tree whose sap provided dye for early settlers. They may also conjecture if William saw to the planting of the tree box, *Buxus sempervirens* arborescens var., and the giant *Ginkgo biloba.* It is known that about 1784 three young ginkgos were sent from England to William Hamilton. He planted two in his garden, the "Wood-

lands", now a cemetery, and gave the third to William Bartram.

The great black mulberry, *Morus nigra* memorializes the fruitless dream of those who attempted to establish a silk industry in this country. West of the house are several specimens of the Franklin tree, *Franklinia alatamaha,* descendents, no doubt, of seeds gathered by William. There are plenty of other tree and shrub offspring of original plantings to entice the visitor to explore this significant garden.

Restore, Preserve and Promote

Since the John Bartram Association affiliated with the Garden Club of Pennsylvania in 1950, the current hostess garden club is responsible for suitable colonial arrangements for the house, also its Christmas decorations. It provides hostesses and guides for special events and occasionally raises funds for special plantings.

The John Bartram Association continues to restore, preserve and promote the heritage of Bartram's Garden. They furnished the house, provide many plantings, pay for part of the help, supply literature for sale and underwrite much of the research.

Around the clock guards are provided by the Fairmount Park Commission which has charge of maintenance and capital improvements. Correct and current labels are a challenge in any garden. Fairmount Park Commission has begun replacement of the outdated remnants from three former sets of names using currently correct labels which are highly legible and hopefully vandal-proof. It maintains eleven acres as garden with the rest having picnic benches, a baseball field and playground areas. The grounds are always open and free except for a small fee required to see the house itself.

Engulfed by the city, nudged by a housing project, fighting the pollution of its swamp areas by neighboring industries, Bartram's Garden remains a magic carpet to carry the visitor back through the pages of history to glimpse again the garden of America's first botanist.

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A watercolor-drawing, inspired by display of hibiscus at Denver Botanic Gardens, done by Mrs. Barbara Nielsen. The picture was exhibited in June at the Colorado Watercolor Society sale and exhibition in Horticulture Hall.

KERRIAS

A. C. Hildreth

Kerrias are seldom planted in the Denver area. Yet these attractive shrubs are well adapted to the climate and soils of the plains. The bush is upright in form and about eight feet tall. The many slender stems, or canes, arise from the ground after the fashion of a bamboo clump. The twigs and young stems are bright green the year around, making this one of the few hardy shrubs worth growing for its bark color.

The dark green leaves are heavily veined and have coarsely-toothed margins. The fully double flowers are about an inch and a half in diameter and golden orange in color. Blooming starts the latter part of May and continues two or three weeks, after which occasional flowers open until the end of the growing season.

Kerrias are suitable for border planting and are especially good as specimens. They should be planted where they will have at least partial shade. The north side of a building is an ideal site. These shrubs require no special treatment as regards watering, fertilizing or mulching and they are generally free from insect pests and diseases.

The indeterminate growth habit of these shrubs makes the branch tips liable to some killing back in winter. The damaged tips turn brown. In order to improve the decorative effect of the shrubs, the brown tips should be snipped off as soon as they are detected.

On old stems, the bark color changes from green to brown. The brown discoloration detracts from the appearance, especially after leaf fall. The brown-barked stems, together with any very weak or damaged green stems, should be cut back to the ground immediately after the blooms have faded, This practice also serves as a rejuvenation treatment, keeping the bushes continuously in a vigorous condition.

Kerria bushes tend to develop suckers. These can be dug up and transplanted to some other part of the garden or given to friends. If not needed for such purposes, the suckers should be dug up and discarded as they appear, otherwise they eventually will develop into a thicket.

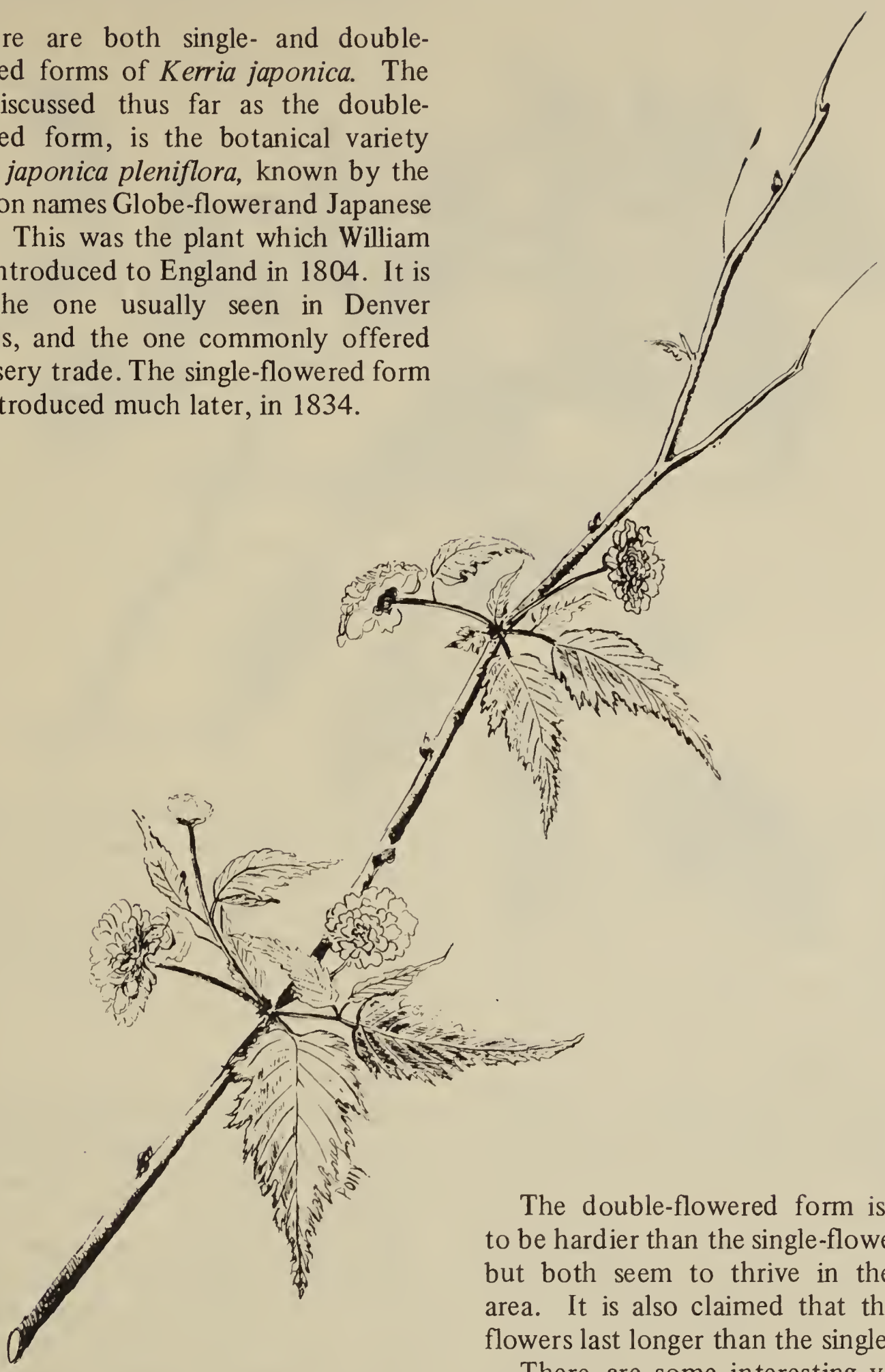
Nurserymen propagate Kerrias by cuttings of mature wood taken preferably in early fall and rooted in the greenhouse. They may be increased also by dividing old clumps or simply by digging up young suckers and transplanting them to nursery rows where they are grown to marketable size.

Kerrias belong to the Rose Family, Rosaceae. Botanists recognize only one species, *Kerria japonica,* native in China. This species has been known by the common names Kerrybush and Jews-mallow, but Kerria is now generally used as the common name as well as the generic name.

From such names as Kerria and Kerry-bush, it might be concluded that this shrub is associated in some way with County Kerry, Ireland. Such, however, is not the case. The name Kerria honors William Kerr, a gardener, of Kew, England who introduced to England from China,

this and many other different kinds of plants.

There are both single- and double-flowered forms of *Kerria japonica.* The one discussed thus far as the double-flowered form, is the botanical variety *Kerria japonica pleniflora,* known by the common names Globe-flower and Japanese Rose. This was the plant which William Kerr introduced to England in 1804. It is also the one usually seen in Denver gardens, and the one commonly offered in nursery trade. The single-flowered form was introduced much later, in 1834.



The beauty of a branch from Dr. Hildreth's Kerria.

The double-flowered form is reputed to be hardier than the single-flowered one, but both seem to thrive in the Denver area. It is also claimed that the double flowers last longer than the single ones.

There are some interesting variegated botanical varieties of Kerria:

Kerria japonica picta, a dwarf shrub, less than three feet tall. It has white-edged leaves and single orange flowers.

Kerria japonica aureo-vititta ta has green and yellow striped stems.

Kerria japonica aureo-variegata has leaves edged with yellow.

Apparently, none of these three variegated forms has yet reached Denver.

Exotics of COLORADO

Oregon Hollygrape, *Mahonia aquifolium*

Helen Marsh Zeiner

Newcomers to the Denver area are often disappointed because there are so few broad-leaved evergreens available for landscaping. It is true that broad-leaved evergreens are adapted to more humid climates and most of them do not tolerate our sunny, dry winters. Fortunately, however, time has proven that Oregon hollygrape or Mahonia, one of the most beautiful of all broad-leaved evergreens, can be grown in Denver under proper conditions.

Because they are plants of moist, humid regions, leaves of broad-leaved evergreens burn when they are exposed to sun and dry air during the winter. If grown in full sun they will lose their leaves in the autumn. In the Denver area, Oregon hollygrape should be planted in the partial shade of an east or north exposure. With plenty of water and good cultural care, it should remain attractive all year long. Any winter-burned leaves can be cut off in the spring.

Oregon hollygrape or Mahonia is a medium-sized shrub, averaging about 4 feet in height. It is grown primarily for its foliage which resembles that of Christmas holly. Each leaf is made up of 5 to 9 spiny-toothed leaflets. They are leathery, shiny above and pale green beneath. They often take on a metallic appearance, and in autumn they may turn red or bronze. New summer growth is a light shade of green.

The small yellow flowers are produced in dense clusters followed by dark blue berries in bunches somewhat reminiscent of grapes. The berries are edible and can be used to make jelly.

The name Oregon hollygrape is very appropriate, reflecting the shape of the leaves and the appearance of the clustered berries. The shrub grows naturally from British Columbia to California and is the state flower of Oregon – hence Oregon hollygrape.

Oregon hollygrape is a member of the barberry family, *Berberidaceae.* Other well-known members of the family include Japanese barberry *(Berberis japonica* Spreng.) a popular ornamental shrub; and common or European barberry *(Berberis vulgaris* L.), an introduced shrub often escaped from cultivation. Because



European barberry is an alternate host for harmful wheat rust, it has been nearly eradicated in wheat-growing areas. Not all members of the family are shrubs – May apple or mandrake *(Podophyllum peltatum* L.) is a well-known wild flower of the eastern woodlands.

You may find Oregon hollygrape listed as either *Berberis aquifolium* Pursh or *Mahonia aquifolium* Nutt. Oregon hollygrape was originally (1814) classified as *Berberis.* Later, in 1818, it was reclassified as *Mahonia,* primarily because of its pinnately compound leaves and unarmed branches. In the genus *Berberis,* only the terminal leaflet develops into a foliage leaf and the other leaflets are modified into thorns at the base of what appears to be a simple leaf. Some present-day taxonomists feel that the differences are not sufficient to justify separating *Mahonia* as a genus, and they return these pinnate-leaved shrubs to the genus *Berberis.* Most reference books on shrubs, however, still list Oregon hollygrape as *Mahonia.*

Berberis is derived from an Arabic name for the fruit – *Berberys. Aquifolium* is from the Latin, meaning point and leaf and referring to the spiny leaves. *Mahonia* is named for Bernard McMahon or MacMahon, an Irish-American horticulturist who lived from 1775 to 1816.

For political reasons, MacMahon left Ireland and came to America. In 1796, he settled in Philadelphia and established a nursery and seed house. His place of

business became a horticultural center where many prominent horticulturists gathered for discussion. MacMahon was active in exchanging seeds and plants from other parts of the United States and from other countries. Many of the seeds brought back from the Lewis and Clarke expedition were entrusted to MacMahon by President Jefferson.

Oregon hollygrape was introduced into England by David Douglas who explored the Pacific northwest between 1825 and 1827 and took the shrub back to England when he returned. By 1838 it was widely used in England and was considered by many gardeners to be the most attractive broad-leaved evergreen grown in England.

A close relative of Oregon hollygrape grows in the mountains of Colorado. This is *Berberis repens* Lindl, (or *Mahonia repens* Don), commonly called Oregon grape. It is a low-growing, creeping ground cover found on hills and slopes, often in partial shade. It is valuable in preventing erosion and providing food for birds and mammals.

The species name *repens* means creeping. The plant resembles *Mahonia aquifolium* closely except for its prostrate habit of growth. *Berberis repens* is sometimes grown in Denver as a ground cover, attaining a height of about a foot. Native plants do not transplant well and they should not be removed from their natural habitat where they are an important part of the ecological system. Buy nursery-grown stock which is easily transplanted and established and can be counted on to succeed.



These two, who belong with the guided tours up front, got lost and wandered into Helen Zeiner's exotics.



AT DENVER BOTANIC GARDENS

Gift Shop

FRIDAY AND SATURDAY — NOVEMBER 18 & 19 — 10 A.M. TO 4:30 P.M.





The Fountain Butterfly Bush



Avalonne Kosanke

Ever have a yen for your very own butterfly ballet? Or have a dry sunny spot in your garden boasting poor but well-drained soil? Then you have the perfect combination for growing *Buddleia alternifolia,* Maxim., also known as the fountain butterfly bush. From late May till mid-June, its slender twelve to thirty-six inch branches are transformed into sweeping arcs of lavender set into motion by the slightest breeze. Thousands of tiny, tightly clustered blossoms emerge along the stems in their special spiraling pattern. Their fragrance proves irresistible to all types of butterflies, especially the drifting swallowtails. It is not unusual to count in one glance a dozen huge black and/or yellow beauties vying shamelessly with lesser butterflies, moths and a motley crew of other insects for a foothold on the freshest flower.

Buddleias belong to the family Loganiaceae. Carolus Linnaeus named the genus Buddleia in honor of Reverend Adam Buddle, vicar of Farnbridge, England. It was a courtesy well-deserved, for this clergyman's work as a botanist overshadowed his work for the church, and his collection of plants is preserved in the British Museum. The name "alternifolia" recognizes this species' alternate leaf pattern which sets it apart from most of its relatives.

Of the nearly 150 known species of *Buddleia,* only two are indigenous to this country, none to Colorado. Most are found in warmer climes of Asia, South America and south Africa. Some make fine greenhouse subjects. Few are suitable as shrubs for our gardens since they tend to freeze to the ground.

B. alternifolia was found in Kansu (Northwest), China, and was later introduced into cultivation by Reginald Farrer. It is the earliest of the Buddleias to bloom. Unlike its more tender relatives, this woody shrub does not freeze back in our normal winters. Its arching form contrasts gracefully with the usually rigid silhouettes of other border shrubs. In early May, the one-to-four inch willow-like leaves appear showing only their silvery undersides. As the blades lengthen during the flowering period, the rich green of the upper surface finally dominates.

A Handsome Addition

The spectacular bloom gives way suddenly to a period of new growth. Shoots emerge at awkward right angles along the spent, pendulous branches. Now is the time to prune severely. Thin out poorly placed, unwanted canes. Cut back branches by one-third or to a well-placed young shoot. Done annually this prevents a scraggly look, keeps the shrub within desired boundaries and encourages next year's bloom to set on the newly formed wood. Here in Colorado, fountain butterfly bush may spread ten feet across and arch skyward almost the same, as in the specimen pictured. For the smaller garden, judicious pruning will keep it restricted to a smaller space without sacrificing heavy bloom. If an early spring examination reveals freeze damage, prune well below the injured portion back to live wood. Vigorous new growth will soon cover the scars.

The fountain butterfly bush is a handsome addition to the shrub border. It is an effective screening plant for privacy. It is popular with several species of birds as its seeds ripen. Try it as a specimen billowing over a wooden fence or down a rocky wall. Plant it where you can sit awhile and "pleasure" in its beauty. Plant it for its heliotrope-like fragrance drifting across the garden, delight in the butterflies it lures. Plant it so that all who pass may share in your good fortune.



IN PRAISE OF THE GLADIOLUS

Some instructions
on its culture

Some recommended
varities



Lee Ashley

The most beautiful of our summer flowering bulbs is the gladiolus. It's spikes are tall, some five feet or more in height, and often there are several spikes from the same bulb. The flowers are of almost every desirable color -- bright red, creamy white, pure yellow, green, many tints of pink, and those with lovely blotched throats. Perhaps we have no flower which presents such a gorgeous display of delicate yet brilliant colors in the garden, on the exhibition tables, and when used as floral decorations. It is not strange that the gladiolus is exceedingly popular.

For many years the hybridizers have been working with the gladiolus to improve its color and growing habits. Here in Denver we have several people doing hybridizing and we have managed to add a few ruffles to the petals, creating varieties called "pleated" gladioli by the public. These flowers have substance so heavy that it is a wonder they can ever open. They have created much interest at the flower shows and the corms have been sold for as much as ten dollars each.

The bulb, as it is commonly called, is really a corm, and from this grows the erect stem terminating in a spike of flowers.

The culture is very simple. Set the corms from six to nine inches apart and cover about four to six inches. If set in rows, they may be closer. Planting may be done at different times from the end of April to the first of June to secure a long succession of bloom. Keep the earth mellow, and add a little superphosphate to make them grow strong.

Give them plenty of water, especially at the time the fourth leaf shows. This is when they start to produce the flower spikes. It is also necessary to spray them for thrips. We spray with one of the insecticides made for this purpose. By spraying every ten days and using several different brands, you can prevent all traces of thrips.

In the late fall, take up the bulbs, let

them dry for a week or more, and remove the old corm and roots. We cut off the tops close to the corm when they are dug. Dust with a soil-and-bulb dust and store in paper sacks in your basement. They will be ready to perform again next year.

I have never known a case where the gladiolus failed to give the most perfect satisfaction, opening a new field of beauty to those unacquainted with its merits. It thrives all over America; its healthy plants providing thousands of blooms for the florists to use every day of the year.

Here is a list of some of the best bets of a Grand Champ:

Vicki Lin, *pink*
Parade, *salmon*
Lady Bountiful *cream*
Angel Eyes, *white, lavender blotch*
Pink Prospector, *pink*
Shirley Cole, *red*
Moon Mirage, *yellow*
Parsifal, *white*
Dairy Queen, *cream*
Isle of Capri, *orange*

Here are some that were created here at Denver Botanic Gardens. For real beauty these are hard to beat:

Pleated Lace, *orange*
Charming Maid, *salmon*
Doubloon, *yellow*
Tokay, *light purple*
Osa Mae, *salmon orange*
Rare Jewel, *rich lavender*
Apache Girl, *yellow-orange*
Rose Point, *rose-pink*
Spun Gold, *deep yellow*

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THE KATHRYN KALMBACH BOTANICAL STAMP COLLECTION



7,000 STAMPS

127 PLANT FAMILIES

Solange Huggins

The Helen Fowler Library now houses the Kathryn Kalmbach botanical stamp collection. The four albums of postage stamps, lovingly collected and meticulously classified and arranged by Mrs. Kalmbach, were presented to Denver Botanic Gardens by Dr. Edwin R. Kalmbach.

The name of Kathryn Kalmbach (1886-1962) has been associated with DBG for many years. She was a frequent contributor to *The Green Thumb,* writing on botanical and horticultural subjects. Her special interest was in the herbarium which now bears her name, and she worked tirelessly with local botanists to collect and prepare specimens for it.

A collection of botanical stamps is an entirely fitting endeavor for such a person. Characteristically, she made her collection a scientific one, and it came to be outstanding in its field. Mrs. Kalmbach was a member of the American Topical Association, an organization of philatelists collecting by subjects rather than by country. Her articles in the journal of this society brought her recognition as an authority in the field of plants on stamps.

The best method of describing the stamp collection is perhaps to use the words of Mrs. Kalmbach in her introduction to the first album, dated November, 1956:

> An article in the American Gardeners' Chronicle in 1945 by Mr. Charles H. Curtis of England, described his collection of plants on stamps, which was arranged by plant families, rather than by countries. At the suggestion of Professor Joseph A. Ewan, then botanist at the University of Colorado, I began a search for stamps picturing plant life, in hopes of making a similar collection. Growing slowly at first, the last few years more rapidly, my collection at this writing shows over 5,000 stamps arranged under 99 flowering plant families, and four non-flowering groups. (In 1960: 7,000 stamps and 127 families.) My collection includes not only those stamps with plants as the main feature, but also those having plants as parts of border designs, or other minor decorations. Used, as well as mint stamps, are included.

Stamps in each of the plant groups are arranged alphabetically by countries; except that any United States representative are always at the beginning of each group.

The collection also includes, in a separate division, stamps picturing agricultural subjects. These subjects include all forms of farm work, such as plowing, sowing, harvesting, etc., as well as farm machinery, farm buildings, farmers and farm children. Other occupations using plant products are also included, such as basket making, textile work, logging, etc. There are also shown botanists, botanical gardens, agricultural scientists and institutions, parks, etc. This part of the collection will be found in Volume IV, following the plant families.

The Denver Botanic Gardens appreciates the gift of this collection to the Helen Fowler Library. No stamps have been added since the death of Mrs. Kalmbach in 1962. Obviously, this collection should be continued and so we are asking our members and friends to add to it. Should you see any stamps depicting botanical and/or horticultural subjects as well as those featuring the subjects enumerated for volume four, please save then for the library. To prevent damage to a cancelled stamp a margin of ½ inch of paper should be left around it.

The stamps will be shown to interested individuals by appointment. Please call 297-2547, Ext. 24.

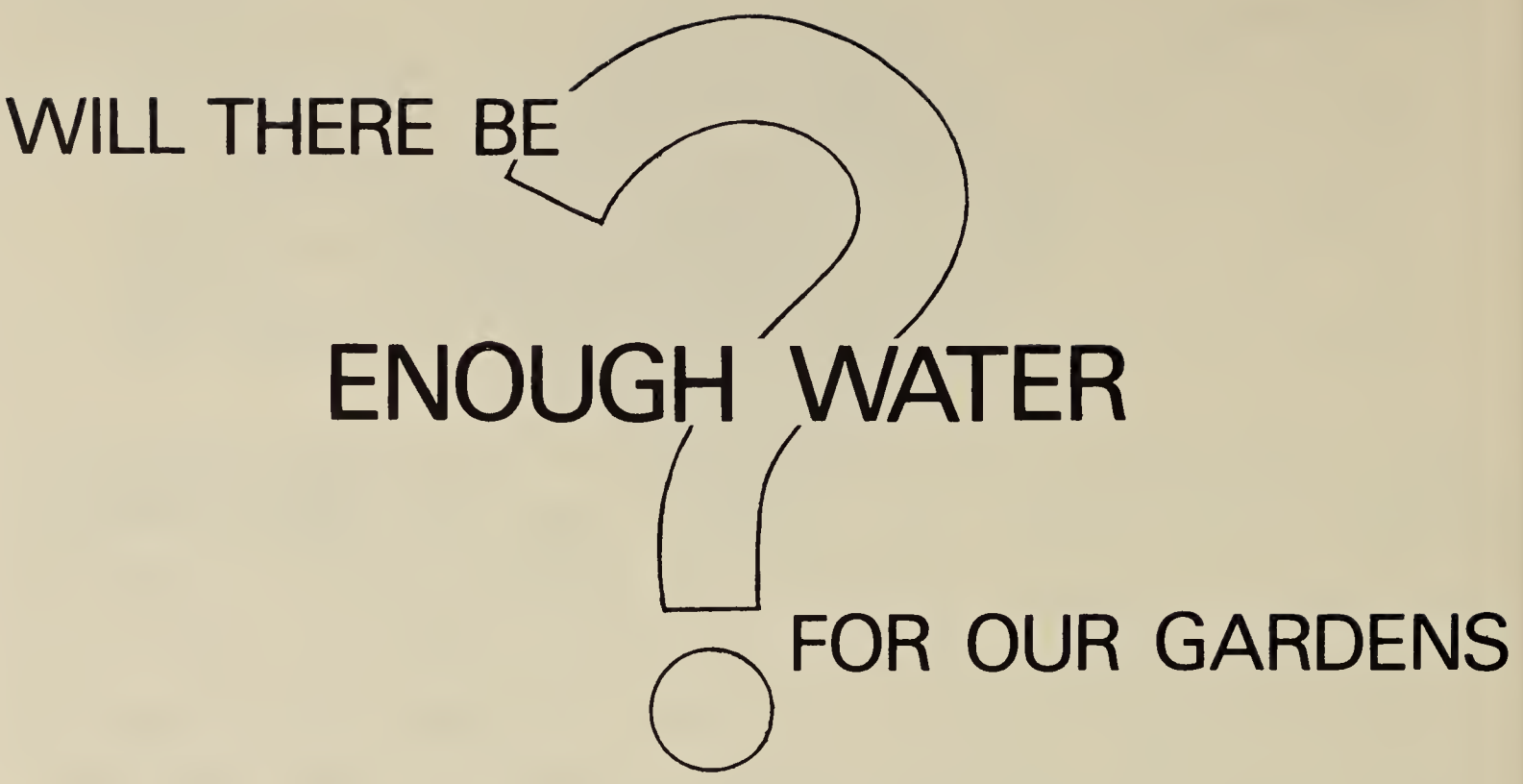
LET'S PLAN FOR A BEAUTIFUL COLORADO IN 1976!

George Kelly

Plans are now being formulated for a great Centennial-Bicentennial of the statehood of Colorado and of the beginning of our United States. Thousands of people will be flocking into our state in 1976 and we will need to put our best foot forward, sweep our floors and wash our windows, to properly present our state to our many guests.

What better time than now to survey every community, small and large, and make definite plans for needed improvements – trees, parks, playgrounds, business fronts – and for displaying our mountains, canyons and forests at their best. In doing this we can develop to the fullest the use of new plants, especially our own good natives, teach everyone a better use of water, soil and fertilizer, and really develop a much needed "Landscape Architecture for Colorado."

Here is where we need dedicated leadership. We have in Colorado many competent people who are experts in all phases of horticulture, and who could now contribute of their expertise in really dressing up the state for this occasion. The horticulture departments of our colleges, the Botanic Gardens, the Nurserymen's Association, Association of Landscape Architects, garden clubs and others should immediately get together and plan to cooperate with this celebration committee to get this necessary work planned now and executed in time for the 1976 events. We need leadership. Where will we get it? Who will volunteer?



Today's Situation, Tomorrow's Probabilities: According to a Long-Range Study by the Denver Water Department.

After water is supplied to all the new homes and industries in the booming Denver area, will there be enough water left over to irrigate our lawns and trees and gardens?

As the area's growth spirals upward, eating up the open space around us, bringing more people, more houses, more commerce and industry, horticulturists and home-owners are increasingly concerned about the future supply of water needed to maintain this oasis.

What can we expect?

There are some answers in the large three-volume study, published in June, 1969, by the Denver Regional Council of Governments. Called "Metropolitan Water Requirements and Resources," the study was made by the Denver Water Department. It covered the urbanized portions of Adams, Arapahoe, Boulder, Denver and Jefferson Counties.

Yes, says the study, there will be enough water for landscape irrigation; if population growth continues as indicated in 1969, if our uses of water are about the same as they have been, and if all the planned water developments are financed and built.

The 1968 study discusses the irrigation situation to some extent, beginning with records of the U. S. Weather Bureau in Denver:

"Winter months are normally driest with December and January each recording about ½ inch of moisture. The high frequency of either dry Continental or exhausted Pacific air masses account for these dry winters. The spring months of April and May are typically the wettest, as moist air from the Gulf of Mexico begins seasonal penetration northward up the high plains. The mild months of June through October average an inch of rainfall or better. However, this rainfall is usually very spotty with showery characteristics. On the whole, the urban climate is most accurately described as semi-arid. Native vegetation when man first settled the region was primarily grasses and shrubs with only a few deciduous trees along the stream beds. It is said that whenever you see a tree in Denver today it is there because somebody cared enough to water it. The natural rainfall does not favor extensive vegetation."

In two out of ten years, the study says, Denver has 11.4 inches of precipitation or less, and the winter months will average ¼ inch or under. At the other extreme, two out of ten years will have 18.4 inches or more. 1965, with its floods, was one of those wet years. (Compare Denver's average of 14.81 inches with Cincinnati's 39.51 inches, Chicago's 33.18, Des Moines' 30.37, Omaha's 27.56, and New York's 42.37 inches.) Paradoxically, Denver's most critical water problems are recurring drought and floods.



Marston Lake – Denver Water System

40% FOR LAWNS

It is pointed out in the Water Board study that our semi-arid climate requires large amounts of artificial moisture to support growth of lawns, trees and flowers. The study says that it takes about one inch of water per week for our lawns during the May through September growing season when normal precipitation is only eight inches. Therefore, about 18 inches of additional water is required. Little, if any, of this water returns to the ground water aquifer since the general movement of moisture in the top 4 to 6 feet of soil is upward toward the atmosphere. Nearly 40 percent of the municipal and industrial water supply is used for lawn sprinkling.

The quantity of irrigation water used in Denver, the study says, is dependent on these things: the amount of precipitation, the cost of the water, whether it is metered or not, the economic level of a neighborhood, the restrictions placed on water use, and, especially, the public concern regarding the adequacy of the water supply.

In looking to the future, the study lists several factors that could reduce irrigation demand. Lawns may be artificial, not requiring water, or lawn area may shrink or even disappear in large urban areas as multi-family dwellings attract a larger segment of the population. Other technical changes may provide de-humidification of the air or recycling of domestic wastes to irrigate lawns on an individual housing unit basis.

Nevertheless, the study reasons that "because technology of water supply has changed very little in this century, all projections ... are based on current conditions." That is, the experts expect us to use water in about the same quantities as in the past.

458 MILLION GALLONS IN A DAY

Most of the study is made up of projections of population, water supply, and water demand in the future. In 1969, when the study was completed, the Denver Metro area was estimated to have a population of 1,200,000. Denver itself had a water supply of 319,000 acre feet, and other agencies had 110,000 acre feet; a total for the area of 429,000 acre feet. 1969 demand for industrial and municipal use of water was estimated at 262,000 acre feet, well below the supply.

(Literature sent out by the *Water Is Necessary Committee,* prior to the recent bond election, reported this near-shortage: "The complex Denver water system ... is capable of treating and delivering approximately 460 million gallons of water a day. On July 12, 1971, the temperature hit 101 in Denver. The city's water use soared to 458 million gallons. Not that the city would have run out of water if the use rate had exceeded 460 million gallons. The Water Board has an additional 246.9 million gallons in small treated water reservoirs at strategic locations throughout the service area. But the system could not have absorbed a series of such days without severely restricting water use. And, in the future, there will be many hot days and ever-increasing numbers of Denverites using water.")

Water supply as used in the study, was figured on a "safe annual yield basis" defined as "the lowest yields recorded." The sources of the Denver area's supply in 1969, computed on the safe annual yield basis, were:

	ACRE FEET
South Platte River	153,400
Wells	7,000
Transmountain Diversion	
Moffat Tunnel	70,000
Big Thompson	18,000
Blue River	168,200
Homestake Project	12,400
Total	429,000

(An acre foot is the amount of water required to cover one acre one foot deep, or 326,000 gallons.)

Future population, water supply, and water demand, for the Metro area, were projected as:

	1975	1990	2010
Population	1,378,150	2,024,900	2,687,300
Supply (Acre feet)	487,640	634,320	798,840
Demand (Acre feet)	328,630	496,830	749,080



Eleven Mile Dam and Reservoir

From this, it appears there will be no shortage of water for the area until after 2010 – if all proposed developments are financed and built.

Says the report: "Included in the projection of supplies are additional waters from the present Moffat, Blue River and Homestake sources" and "new supplies from Englewood's Ranch Creek, Denver's Eagle-Piney, Straight Creek, Gore and Colorado River sources." Our future water supplies, then, are to come from the Western Slope of the Rockies. The additional sources mentioned were in the preliminary planning stage at the time of the study.

An interesting statement in the report is to the effect that converting our land to municipal and industrial uses will provide a growing supply of water. Presumably this means that considerable water now used for agriculture will become available for other uses.

DENVER TO SUPPLY THE AREA

The major premise of the study is a fairly new one: the Denver Water Department no longer looks on itself as just a supplier of water to the city itself; it is now and will continue to be the primary source of water for the whole metropolitan area. In fact, its importance to the community outside the city will greatly increase in the future as some of the smaller systems, including Golden, Baker Water District, Broomfield, Louisville and Lafayette, and others, run out of water. This new status as the regional supplier of water was at the bottom of the opposition to the water bonds voted on in July. Opponents hoped to limit regional growth by limiting water supply – a policy the State of Colorado has been wrestling with in recent legislatures.

On July 11, the voters of Denver defeated a Denver Water Board proposal to issue bonds for $200 million to pay for the enlargement and improvement of the city's water system. By their vote, the majority appeared to be saying that they did not feel that the Denver system should furnish water for unlimited growth outside the city.

In addition to the $200 million bond issue which was turned down, the Water Board had expected to obtain another $155 million from "development" charges to finance a 12-year plan.

The plan included a new $60 million Foothills Complex on the South Platte for treatment of the water, $76 million for additional and replacement transmission pipe lines, some $20 million for a recycling project, $31 million for extension of the Fraser River and Williams Fork collection systems, $103 million for a project to bring water from the Eagle and Piney River into the Dillon Reservoir, and sufficient funds for improvement and expansion of present facilities.

Undoubtedly, this rejection of the bond proposal has put a brake on the contemplated developments. It could mean that there will not be as much water for landscape irrigation as expected. It may mean that water will cost us more than in the past.

Makers of The Magazine

Wes Woodward

You may have noticed. Beginning with the Summer issue *The Green Thumb* had a new editor - me. I am on trial as a successor to Margaret Sikes who is, you know,Educational Director, and too busy for this.

Actually, my connection with the magazine began back in March. So, up until July, when this is written, I had attended five monthly meetings of the editorial committee. I want to tell you about the members of that committee because I am impressed by these talented and determined people.

In the ten years since the spring of 1962 *The Green Thumb* has published 529 signed articles. Over one-third of those were written by the *present* members of the editorial committee. Written well and authoritatively.

Helen Marsh Zeiner leads the list of writers with 47 articles, 26 of them in the continuing series called "Exotics of Colorado." Peg Hayward, writing principally on the plants in the conservatory, formerly under the title "Plant of the Month" and recently "Focus on...," has contributed 28 articles. You'll agree, I'm sure, that the regular appearance of the work of these two writers is the backbone of our magazine. Both of them give us much information in the best of style.

And then there's Bernice Petersen. Her signed articles in *The Green Thumb,* including the delightful "Pete Ponders" series, total 26. There were more, before 1962, and some, I am sure, that weren't credited to her. You know, too, that she has done far more than write. Energetically, with enthusiasm and unfailing kindness, she has provided the motive power for *The Green Thumb* for a long time. I don't know how long Bernice (Pete, to some of you) has been on the editorial committee; she was there in 1962 where my study of the magazine begins; and she has been chairman since 1968.

Dignity and understanding are furnished by Dr. Hildreth, who has always been close to the magazine as Director and Director Emeritus of Botanic Gardens. He has had 17 articles in *The Green Thumb* in those ten years, and continues actively on the committee with wise advice and humorous appraisal.

Ten of the articles since 1962, mostly on landscape planning, came from the pen of Frances Novitt, and nine were written by Avalonne Kosanke with much verve and knowledge. Dr. Moras L. Shubert also contributed nine informative articles to *The Green Thumb* in that period.

Other writers for *The Green Thumb,* also members of the committee, have been Suzanne Ash, Lucy Crissey, Dr. Gambill, Solange Huggins, and Polly Steele.

And the art work! I've made no count of the number of drawings by our artists. There were many and they were memorable. The scratch board drawings by Suzanne Ash are truly outstanding, giving *The Green Thumb* "class." Faithful Polly Steele has brightened the pages of the magazine innumerable times with her lively and amusing work. Phil

Hayward, not a member of the committee but close to it, has certainly created works of art that are much appreciated. We are fortunate to have such artists as these.

This spring, when I started work on the summer issue, Margaret Sikes turned over to me most of the material needed for that issue. She, and the rest of the committee, were completely prepared.

It's plain to see that these dedicated people, so involved and so concerned with our magazine, have made it and maintained it and continue to strengthen it, regardless of printers and editors who may come and go, They, and all the others before them, have established a magazine with a vibrant life of its own; a growing thing, firmly rooted in experience, sending up strong healthy foliage in the sun, flowering profusely, and delighting all who love plants and gardens and beauty.

As Denver Botanic Gardens expands, becoming the prestigious center of horticulture in the West, *The Green Thumb* must move with it as the resonant voice of The Gardens. I am enthused over the opportunity to have part in publishing *The Green Thumb.*

My credentials: I am now one of Colorado's three state land commissioners, a position I will leave in January, 1973. A long-time civil engineer, I am a past president and honorary life member of the Colorado Society of Engineers. My greatest interests have been in gardening and journalism. I have been publisher of one weekly newspaper, editor of another, editor of an engineering magazine, and I have, for years, written regular monthly columns for two engineering magazines. This year I am president of Men's Garden Club of Denver.



View of the Future – New Walk, Denver Botanic Garden

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TELEPHONES

Denver Botanic Gardens 297-2547
Conservatory Superintendent Ext. 21
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The Green Thumb

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Denver Botanic Gardens maintains a collection of living plants, both native and exotic, for the purpose of acquiring, advancing and spreading botanical and horticultural knowledge.

The Green Thumb

VOL. 29, NO. 5 DECEMBER, 1972



THE COVER

Portal to Plans, Parks and People
Entrance to S. R. DeBoer's Office

THE GREEN THUMB

VOL. TWENTY-NINE, NUMBER FIVE

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By becoming a member of Denver Botanic Gardens, you will receive *THE GREEN THUMB* and the monthly *NEWSLETTER*. You will also have unlimited access to the use of the books in the Helen K. Fowler Library, now located in Boettcher Memorial Center at 1005 York Street.

For further information write to Membership Chairman, Botanic Gardens House, 909 York Street, Denver, Colorado 80206, or call 297-2547.

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The Green Thumb

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WES WOODWARD–EDITOR

DECEMBER, 1972

A Tribute to S. R. DeBoer

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S. R. DEBOER

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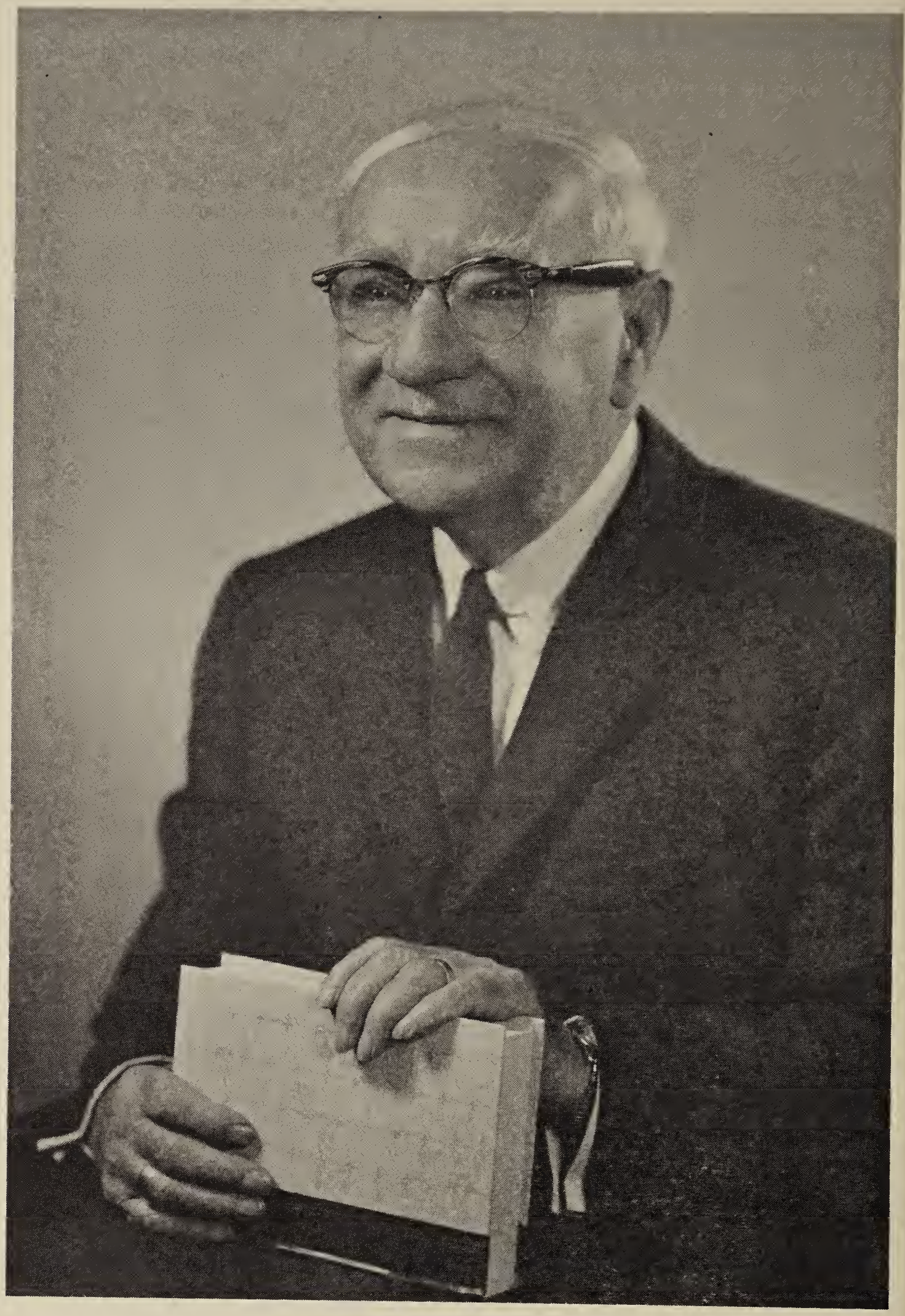
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This is the fifth issue of The Green Thumb in 1972. Not an extra issue, just speeding up to put publication date at the beginning of each season.



S. R. DeBoer, Denver's famous landscape architect and city planner tells of his work and times.

PLANS, PARKS AND PEOPLE

S. R. DeBoer

I

YOUTH IN EUROPE

I was born in the village of Ureterp in the province of Friesland, the Netherlands, on September 7, 1883.

Friesland means "Free Land". The Friesians are known for their independence, for being stubborn, and as having all kinds of bad traits. They are all farmers. In their language the "boer" is the man who owns the farm, the top man of his area. When Napoleon took over Western Europe and installed governors, the governor of Holland decreed that all families should take surnames. Our family called itself DeBoer – the farmer.

The Friesians were with the Angles and Saxons when they invaded Britain after the Roman armies left. Some of them are still there. In 1922, long after I had left Europe, I went to England to study at the

office of Thomas Mawson, and I stayed at the home of Mawson's aunt. My landlady said that my English (really American) was not good, they didn't understand me. She began to talk in a language she thought I couldn't understand. It was just plain Friesian, the same as I and my parents talked. I learned that around Lancaster, north of Liverpool, the native tongue is Friesian.

Friesland is mostly fertile low land deposited by the Rhine, too wet for trees, but producing bluegrass of unusual value. The farmers built up mounds --*terpen*-- and put their farmhouses and churches on the terpen, out of danger in times of high water. The churches had great bells which chimed each hour. The sound can be heard an hour's walk away – three miles or so – so the name of my village, Ureterp means an hour away from the church (on the terpen).

Finally the Rhine deposits built up the land, the people threw up dikes around it, and now they don't need the terpen any more, so they dig them down and use the rich dirt as fertilizer.

Trees grow well in Opsterland, the uplands I came from. Recently I sent money to Holland to buy trees to plant, and they divided the money between the two towns of Ureterp and Drachten. They sent me a photograph of the planting of a red oak tree in a little park there. They have named it DeBoer Park.

School Days

I went to the only school in Ureterp, a public school with six grades. It had been designed by my father who was an architect carrying out his own designs.

We had school from 8 or 8:30 in the morning until 5 at night, and on Saturday mornings, with only a two week summer vacation. Really, we went to school all year round. Learning to read and write in four languages meant lots of work. I was pretty good. I can still read and write in four languages, but when it comes to talking French, I go around the block to avoid it. I can talk German reasonably well, even today. I talk Dutch, of course.

We had very little time for recreation. Our house had a big garden and faced on a canal. The bridge across the canal was very high so that sailing ships could go under it without lowering their masts. It was great fun to ride my father's bicycle – one huge wheel and one little one – down the bridge onto the road that went to the farm places. We ice skated on the canals, of course. We even skated to grade school, although we had to walk the last part. Skating was our big recreation.

Later I went to public high school in the next town of Drachten. It was quite a select school. Back in the 90's, in Holland, there was a good deal of class consciousness, and working people were considered not to amount to anything. They didn't enter these schools. It was just a little bit of a building, with maybe thirty or forty students, a principal who also taught classes, and one teacher – for the whole town of Drachten.

We all thought the teacher was just a nut, but the principal was some-

thing else; he meant business. I learned more from him than from anyone else. He was the one who told my dad, "You got to let that fellow study." I learned four languages and studied far more mathematics than they have in high school here.



It was an hour's walking for our group to get to Drachten. I often think of the terrific change in our lives since those early times. Today we can't walk any more. In the old days we all walked; there weren't even bicycles. The bicycle was our first change in transportation. Of course there were horses; my grandmother had a fancy horse and wagon. She often took me along with her because I was named after her son.

After I graduated from high school I went to the Institute Poutsma. I wanted to be a bridge building engineer who would someday span the canyons of the Alps. This was my pipe dream. While I was there I got desperately sick and the doctor sent me home. That was the end of that.

Sickness and Change

When I was well again, I began to study at home. I kept on studying until I could take an examination for junior engineer in the Dutch government. Junior engineer meant surveyor. There were 150 candidates, graded on ability, and I ranked 18th. But there were only 15 jobs open.

The doctor had told me to get away from engineering and take up something else. So I went in for landscape design because I had a feeling for beauty. This was not taught at school, and I studied at home. Then I went to a special school where they prepared people for all kinds of positions, like the management of plantations in the Indies, you know. I learned plants, and I learned design, and then I took sick again.

Later, when I felt better, I went to southern Germany to attend the Royal Imperial School of Horticulture. This was about 1906. While there I boarded with many other boys at a nearby farmhouse. I drank the water from the pump which was under the barn and made myself terribly sick for a while. The landlady said I didn't need a doctor, she could tell that I had been "trinken wasser." The other boys drank beer. Later on, I took sick in the lungs, as I had several times before, and I had to go back home.

I was studying all the time, even during my sick periods. I was reading all the books I could get, including the big one on landscape design

by Willie Lange, in German, and one by Edward Andre, in French, and all the English books. I still have them, although most of them are now in the Denver Public Library. I don't think anyone could have studied more about landscaping than I did. My parents supported me in all these efforts.

In my unlucky period in the Netherlands, I had a course with a leading architect, and at home I assisted my father in figuring material lists for his building work. There were no adding machines, practically no typewriters, and telephones were only in the houses of the wealthy. My dad employed carpenters and bricklayers and men of that kind. The top carpenter got 15 cents an hour – Dutch cents. In the 1890's that would have been about 4 or 5 cents in our money.

For a while I had my own private landscaping office, and I hired men to prepare the ground for a tree nursery. My dad said, "Pay those boys a little bit more than they get anywhere else." I paid them 67½ cents a day. My uncle, who had the big farm next to us, was paying 50 cents. He told my dad, "If you pay those fellows that much we'll get in trouble." At those rates the boers – the farm owners – got the best kind of help anyone ever had. The laborers worked from sunrise to sunset.

In the summer of 1908 I was desperately sick again, with bleeding in my lungs. The doctors and my family thought I was going to die. Colorado and New Mexico were already famous for their healthy climate. We knew a Dutch school teacher in Maxwell City, New Mexico, who was in the same fix I was. When he wrote for me to come there my folks agreed that if there was a place where I could live, it would be better to go there. My brother took me to the boat at Rotterdam. I went away from Europe thinking what the heck difference does it make if I'm buried in this holy ground of the fathers or somewhere in the mountains of America.

My older brother, the one I went to school with, wanted to go to America with me but his future wife wouldn't let him. He later became an architect. My younger brother went into business and married into a well-to-do family. Both are dead now.



Saco Rienk DeBoer
Picture taken in Holland

II

BEGINNINGS IN AMERICA

I arrived in New York City on Thanksgiving Day in 1908. I was 25 and it was the first time I had seen a huge city. I was so excited I forgot all about being sick. The towering buildings and the narrow streets awed me.

That same evening I left New York by railroad, traveling through Canada and on into St. Louis and Kansas City. From there I was on the Santa Fe, and as I watched the strange land go by I felt that I was really in the Wild West. At the little stations I saw people riding horseback, a new thing to me. I kept remembering that a man on the ship, coming over, had warned me against Maxwell City, where I was headed. He said, "I've been as far west as Iowa, and it's wild and woolly enough for me." Actually, I have never seen anything wild or woolly in Maxwell City, or in the Denver area, or in Iowa.

At last, New Mexico. Getting off the train in Maxwell City I slipped on the snow-covered wooden platform of the station and fell flat on my back. Later, friends joshed me, saying I was trying to kiss the soil of my new homeland. At that time Maxwell City consisted of a general store, a large hotel, and a small hotel where I stayed. The doorknobs were missing, so I slept with the furniture piled up against the door.

I didn't do any work in Maxwell City. The fact is the town, even today, isn't big enough to have any kind of landscape work. I loafed for several months, with my friend, Pete, who came shortly after I was settled down.

I had time to think about what had happened to me in Europe. It had been a devil of a hard time, not for lack of money – my family was pretty well-to-do – but because of the eternal sickness. I would get down, and then I would get well again, and get going on my studies, and then I would have another bleeding in the lungs. I don't want to talk about it. The big story of my life is that I have never been sick since I came to America. I'm still here. I'm 89 years old, and the doctors thought that if I could get to be 40, I would do wonderfully.

Colorado

After a while, I had a toothache. I packed all my stuff and went to Raton for a dentist. When I got there I figured I might as well go on to Denver. So I went to Denver.

I landed at the Union Station and caught a street car to Edgewater. I was going to see a man who had a dairy in Edgewater. I didn't know he actually lived on Sixth Avenue, so I had to walk several miles, carrying my baggage all the way. I stayed in Edgewater a short time. When my money got low I got a job surveying for an irrigation company. They sent me out to Barr Lake, near Hudson.

They put me at the rear end of a tape and I began to learn the American way of surveying. The surveying I had done in Europe was with the metric system and I had to learn all over. I got along all right, mostly because I was very much in earnest about learning how. Then, one day, the chief asked me, "You know what you're doing?" I said, "Yes, I think I do." "All right," he said, "tomorrow morning you stay in camp and draw up the notes we are taking." So I became a draftsman. I was full of pep and energy and, in the long run, I got the regular draftsman's job.

After a while I was transferred to the main office on the top floor of the Ideal Building in Denver. It was a wonderful job. That's when Anna Beth came from Holland and we got married. Things were good. Then the Denver Reservoir and Irrigation Company went broke. Most of the men were let go but some of us were transferred to Canon City on a project like the one at Hudson.

While we were still in Denver a lady reporter from the Denver Post waded through the mud out to our house to interview us. She had found our names in the courthouse records and was curious about the man with the funny name, Saco Rienk, and the lady with the long name, Anna Sophie Elizabeth. Just before she left she asked, kinda shy-like, if I had any noble titles! Our pictures were in the paper.

In Canon City, when we were looking for an apartment, we met a lady who said, "Oh, you're the people who were in the Denver Post!"

I worked as a draftsman on that job too. We enjoyed our stay in Canon City very much. We went for a hike nearly every day and people said, "That's the couple who walk all the time." We walked through the orchard district east of town and climbed up on the hogback. Once we made a long trip up the canyon of the Arkansas to the site where the bridge is now, and we took samples of the sands along the river. Anna Beth thought that all the glittery stuff in the sand was gold. I didn't believe it but I couldn't prove she was wrong. She wrote home about it, telling them that we were in a country where you just scooped up the gold.

I did my darndest on that job, but that company went broke too. Out of 200 engineers, 180 were laid off and 20 of us stayed on. But after six weeks they closed up the whole thing.

I came back to Denver, leaving Anna Beth in Canon City, because I didn't know where we were going. I wasn't worried; I was pretty stuck up because my first year in America had been so successful and I was sure I would get a job in no time. The Moffat Railroad was being built and I went there to get a job. I found out I was too late; all those 180

engineers from the irrigation company had been there six weeks before me.

There was no engineering work of any kind. I tried picking apples, out at Sixth and Colorado Boulevard, but I couldn't pick as many as a common laborer could. I had learned to do some grafting and I got a job grafting six thousand roses for George Brown who had a nursery on Cherry Creek at Colorado Boulevard.

First Work for Denver Parks

In 1910, on my second attempt at the Denver Parks office, I found the new superintendent, Frederick Steinhauer. He asked me if I could do park work. "Yes," I said, "but I'll have to show you. I have no papers or anything." He sent me to the city nursery at 9th and York and put me to work as a teamster. I didn't know how to hitch a horse. When I tried, the horse stepped on my toes. I learned. Charlie Clinton, the other teamster, helped me. He dictated that every time we made a round trip in the middle of the nursery, the horse had to stop and rest. That gave me time to make notes on what was growing there. By the end of two weeks I knew more about the plants that grew in the nursery than anyone in the park office. That old Percheron horse had done me a lot of good.

Of course, Anna Beth had come from Canon City, and we made a home in Denver, not realizing that Denver would be our home for the rest of our lives.

Steinhauer asked me if I could make a plan of a park. I told him I would show him. He sent me down to the park office in the City Hall at 14th and Larimer. I drew up a plan of the Sunken Gardens, just as nice as I could. When it was done, it was printed. Steinhauer, who didn't know a good plan from a poor one, took it to Mayor Speer. Speer said it was all right. That did it. When Speer said I was all right my reputation as a landscape architect was established. The word was spread all through the parks and people called me the man that the mayor got from Holland!



Anna Sophie Elizabeth DeBoer

III

THE SPEER YEARS
Denver Parks and Parkways

ROBERT SPEER, elected mayor in 1904, broke the ice. He started the improvements that made Denver a great city. He was aggressively determined to put his ideas into practice.

Speer got the land. He extended the city boundaries to almost what they are now. He laid out the parks and saw to it that they were built.

It was 1910 when I began to work for Speer and I soon learned that all you needed to get along with him was to put out a good day's work each day. He was a great big fellow and he was stubborn. What he said, by God, you had better do! We park men all liked Mayor Speer.

He got George Kessler from Kansas City to help him on the parks, and Reinhard Scheutze was the local landscape architect. These two, and Frederick Olmsted, were designing Denver parks before I came into the picture. I was the foreign immigrant who appeared in the midst of a big development.

City Park had been started in the 90's; at that time it was miles out of the city. Washington Park had been acquired, through a bond issue, from the South Denver Park District. Speer had bought Berkeley Park, and I think he had begun work on acquiring the mountain parks.

I didn't create the parks, as some people have suggested. All I did was improve them. The park department was desperately in need of somebody who knew about trees and horticulture, and I was lucky enough to fall into the vacuum. After I finished Sunken Gardens Park, I planted trees on the main boulevards simply because there was no one else to do it. I don't claim any special credit for it.

During the decade, 1910 to 1920, the park work was largely the carrying out of the Speer plans. The parks created by Speer were the Civic Center, the Cherry Creek Parkway system (a big job), Berkeley Park, Rocky Mountain Lake Park, and some small ones like Rosedale Park. There was much work to be done in City and Washington Parks. Cheesman Park had been established.

George Edward Kessler (1862-1923) Began, in 1890, to prepare a city-wide plan of parks and boulevards for Kansas City. "His achievements in the next twenty years made Kansas City famous and inspired cities from Salt Lake City to Toledo and from Indianapolis to Mexico City to seek his services"



Robert W. Speer: Born Mt. Union, Pa., 1855. Tuberculosis brought him to Colorado in 1878 at the age of 23. Recovered, he worked as an $8 a week carpet salesman at Daniels and Fisher store. Then into real estate business. Elected city clerk 1884. Appointed postmaster in 1885 (served 4 years). In 1891 was secretary of Lookout Mountain Resort Co., of which H. A. W. Tabor was president. Appointed to Fire and Police Board of Denver (as police commissioner) 1891, reappointed in 1897. In 1901 the governor appointed Speer president of Denver's Board of Public Works. (City government was under state government at that time.) Elected mayor 1904; inaugurated at Tabor Opera House. Returned to office in 1915. Voters approved "Speer Amendment" which gave him "more authority than that of any other mayor of an American city." (Power over all appointments except that of auditor; power to appoint 4 out of 9 members of city council.) "It was probably as close to oligarchic form of government as Denver was ever to experience." Charles A. Johnson, in his book "Denver's Mayor Speer" (1969), says: "He was impatient with slovenly or dilatory endeavor. He drove his subordinates hard, but gave his loyalty in return." When Speer died in 1918, 10,000 people attended his funeral in city auditorium.

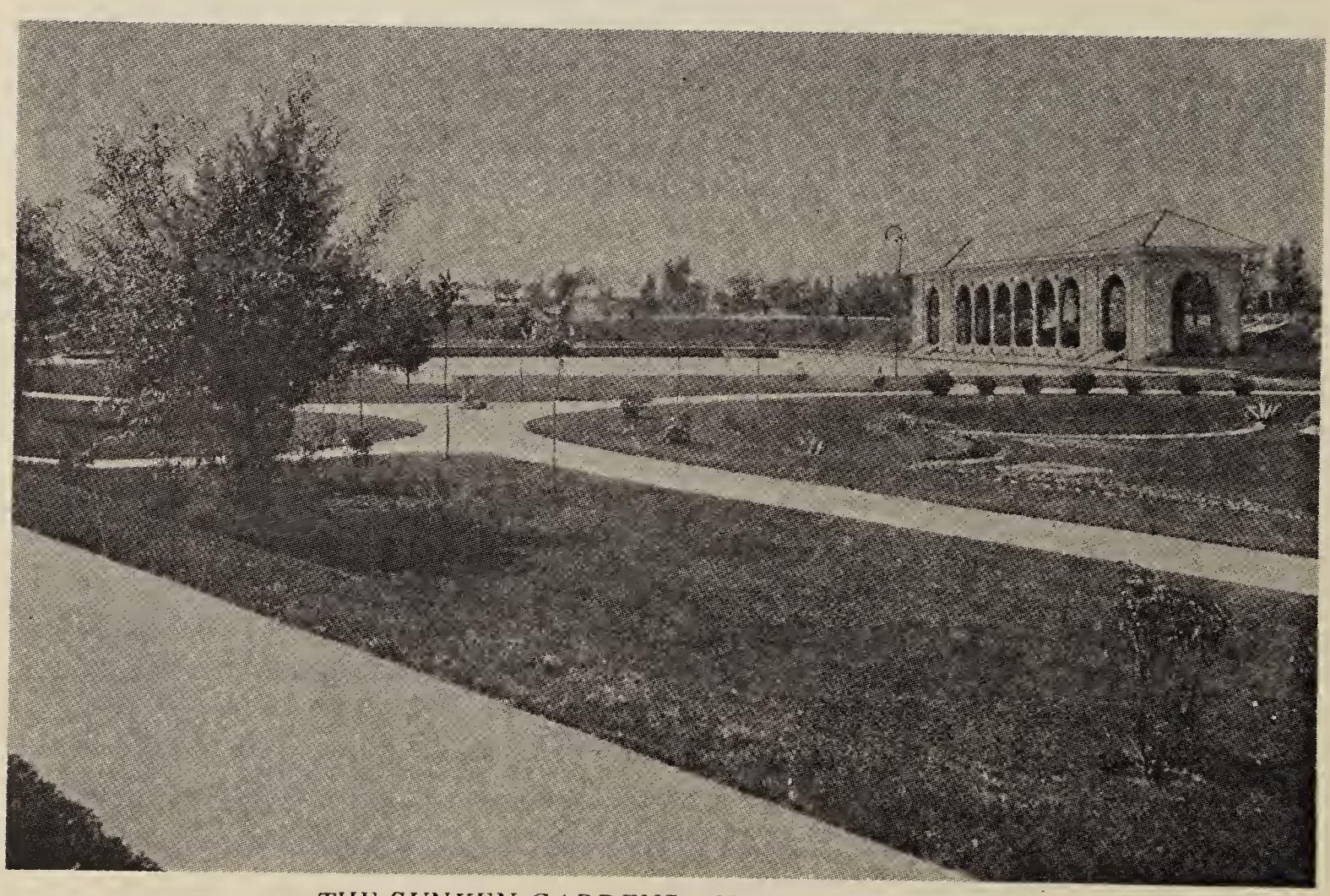
Sunken Gardens

When we started to make Sunken Gardens Park, Cherry Creek was an uncontrolled stream although the concrete walls were about completed on the east side. The main boulevard, east of the creek, was being finished when I started. The west side was still bottomland, but a pavilion for an exhibition had been built in the Sunken Gardens. Later it blew down. The second building there was a nice one, designed by one of our architects. Years later we took it down too because it didn't make sense in front of the new West High School. A big reflecting pool was part of the plan for Sunken Gardens.

After Speer's return to office in 1915 we finished the section of the Sunken Gardens next to 8th Avenue. It included a small rockery made out of building stone and sidewalk flagstones. We didn't use native rock because it would have taken a team and wagon a whole day to haul one load. Water was piped from Cherry Creek to run over the rocks and down a little winding creek into a pool, then back into Cherry Creek. Speer liked the idea and he brought people to see it. Years later a famous landscape man from Brussels called our little waterfall the best bit of landscaping he had ever seen. I write this with a lot of pleasure. The place is somewhat run down now and the water has dried up, but the rocks are still there.

The Parkways

Tree planting on Sixth and Seventeenth Avenues was done hurriedly in 1911 under Speer. Third Avenue parkway was planted in 1914 when



THE SUNKEN GARDENS AND REST PAVILION
1913

he was out of office; there were poor soft maples on the north side and we put in a solid line of English elms on the south side. I wanted to take out the maples and replace them with elms but Speer lived on the parkway and he and his neighbors stopped us. "We have shotguns," he said. We surrendered and left the maples in. It's an unbalanced tree picture. The English elms got scale and were badly damaged. Looking west on Third Avenue there is a beautiful view of the mountains. English elms, which are upright, frame the view; not like American elms which are drooping and wide.

Seventh Avenue got more study. The center parking is designed for variety. We had blocks without planting, or with flowers, followed by tree-planted blocks, some with evergreens, some deciduous, some low, some high. The effect was satisfactory, and still visible. As a frame we planted two rows of American elms between the curb and the sidewalk. Some said they are too close together but they aren't as close as on some of the famous avenues of Europe.

Citizenship and a Buggy

About 1913, when I had been here four or five years, I applied for citizenship. I was to appear before a judge, and a Dutchman friend said he would swear that he had known me five years. But, in court, my friend said he wasn't sure. The judge couldn't take me and I was not naturalized until four months later. I became an American citizen as soon as I could because I saw the great advantages of America. Europe had no such advantages for me.

I was trying to cover all the Denver parks and the park superintendent saw that I couldn't do it on foot. So I got a horse and buggy. At the time, Anna Beth and I were living in a house on King Street in North



Five minutes to pass a lamp post - - - -

Denver. I drove the horse and buggy home every night, and down to City Hall every morning. Maybe I was a little slow. Will Chamberlain, a landscaper, told me, "I've been watching you and your horse, and it takes you exactly five minutes to pass one lamp post."

The horse and I got along all right. We made trips to Platt Park, then across to University Park, and then back to Rocky Mountain Lake Park. I had the horse and buggy for several years. Superintendent Steinhauer got the first auto in the parks department. My first car, several years later, wasn't nearly as dependable as my horse had been. It always had something wrong with it.

Cherry Creek Flood

Mayor Speer's pet project was the Cherry Creek Parkway system. Engineers, following the design principles used in eastern cities, had built high concrete walls on each side of the creek. Little dams were put in to hold the bottom soil of the creek in place. After Speer had been replaced by Mayor Henry Arnold in the 1912 election, and had gone to Europe on a study trip, the new walls were tested.

In June, 1913, a cloudburst hit the upper Cherry Creek valley. I remember that we had taken the Golden street car for a picnic in the mountains that day, and when we returned we heard that Cherry Creek was in flood. We were too tired to go and see it.

At eight o'clock the next morning I drove my horse and buggy to the Eleventh Avenue bridge where we were at work filling in the west boulevard. Cherry Creek was still rushing madly, with water to the tops of the walls. In several places they had toppled over. All the low land on both sides of the creek was under water and the water was deep from the railroad station to Auraria. We had just finished planting grass in the Sunken Gardens the previous Saturday night, but all of the park was buried under three feet of mud and water. The drains were clogged, and Pat Harrington, the park foreman, stood in the water up to the tops of his hip boots, trying to open them.

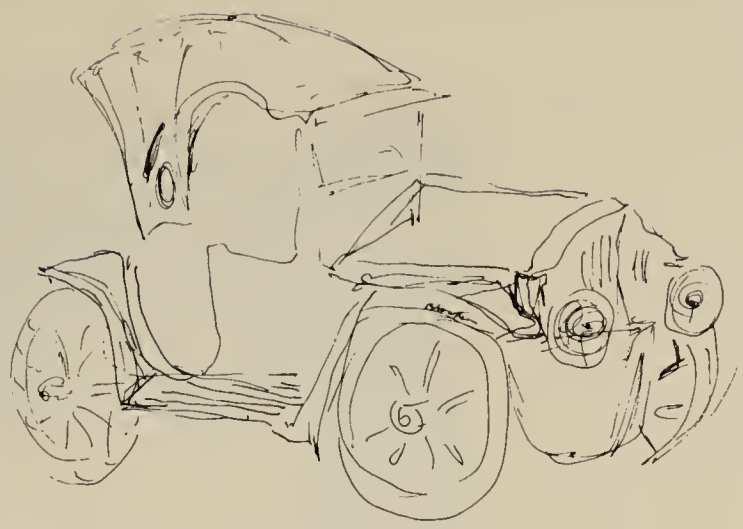
The write-ups in the newspapers were even worse than the flood itself.

By late summer the dirty flood water in the park began to stink so bad that something had to be done. Alec Graham was appointed foreman and we began to clean up the gardens. Some of the muck was dumped east of Broadway for the next section of the west boulevard. We raised the grade of the park, put top soil over the muck, and planted grass again.

It was not until the big floods in 1933 that we discovered why the Cherry Creek walls had toppled. The designs were correct but they were based on the slow water of other regions. In 1933 the water rushed down with great velocity, churning up the creek bottom to a depth of 35 feet. The piles under the wall footings were only 20 feet long and dangled in the wild torrent. They tumbled over and the walls went with them. The main east boulevard along the creek had been curbed and guttered. The curbs and walls settled some but the road stood up fairly

well. Of course, all the walls were rebuilt. We didn't know about floods here; we didn't know then, and I wonder if we know now.

The concrete walls along Cherry Creek were not the kind of thing I would do if I had the choice to make.



Speer Boulevard

Speer Boulevard followed the northeast side of Cherry Creek from the 14th Street viaduct to Downing Street at First Avenue. It was a daring piece of work and it proved to be an unusually important section in the plan of Denver. A line of American elms was put in between the curb and the sidewalk. Later they had to be moved to the space between the walk and the creek wall because they would have interfered with the low street light standards. They are there today, 60 years later. We had hoped to have a similar line of trees on the other side of the boulevard but the opposition from property owners kept us from planting them. Some small triangles were planted with trees.

The Speer plan had been to continue the parkways along the creek all the way through the city but, because of the new country club and its residential area, the parkways ended at Downing.

North of the business district, Speer Boulevard was continued over the 14th Street viaduct into what was called Lake Place, now North Speer. The streets were widened to Federal Boulevard, but the planned diagonal extension to Berkeley Park was never built. Trees taken out on old Lake Place were not replaced.

Forest Drive

Speer came back from Germany full of enthusiasm for the city forests he had seen there. When he was again elected mayor, in 1915, he decided that the strip south of Cherry Creek and east of Broadway would do for a city forest. So we planted a dense forest there. Since we needed a service road we left a 20-foot roadway through it, planting Lombardy poplars on both sides of the roadway. In a few years the poplars grew into a dense hedge. Frances Novitt pictured the effect in a drawing in my book, "Around the Seasons." The lane between Broadway and Logan became one of the sights of the city. Traffic found its way there and the road had to be widened to 30 feet. Later the poplars got a bark disease, more traffic width was needed, and the trees were removed. We planted red oaks at regular intervals through the forest and they are the trees that remain there now.



The poplars on Forest Drive

The section of Forest Drive between Logan and Downing Streets was planted with Colorado blue spruce as the dominating tree. They are of a very blue variety called the Koster spruce, named for a Dutch nurseryman who collected the bluest specimens in Colorado in the 1870's, propagated them, and sold them back to us.

On the planting of Cherry Creek parkway I was under the eye of the mayor all the time. We were filling in on the south side of the creek at Logan and had one man leveling with a team and a little bucket we called a slip, going around slowly to place the soil. Speer walked by there every morning on his way to the office. One morning, after he had gone by, the mayor sent for me. I was trembling. When I was inside his office, he said, "You have one team working there, going around in circles. It'll take him a hundred years to level off that boulevard." I said, "Mayor, we don't have much money." "Who told you to worry about money? I do that. Now get out of here and get that thing done."

It was really Steinhauer's business, so I told him. The next day we had more teams there than we had room for. That's the way Speer was; he was going to improve Denver right now and no doubt about it.

The Civic Center

In 1913 the buildings on the site of the proposed Civic Center were torn down. Frederick Law Olmsted was employed to make a study and plan for the Center. Olmsted had a capable staff of landscape architects. The building part of the plan was done by Arnold Brunner. Work was started soon after and trees were planted.

When Speer returned to office in 1915 he brought with him visions of the German plazas he had seen in Europe – plazas which were mostly paved, with bordering forests and very little grass. He wanted a German plaza for Denver, a place where people could congregate, and he didn't like the Olmsted plan. So he employed Edward Bennett of Chicago to make a new layout. The new plan called for removal of most of the trees.

I plowed up the work that had been done. I worked out what is there now, based on Bennett's plan which included the outdoor theater designed by Marean and Norton and the Voorhies Memorial designed by Fisher and Fisher.

The red oaks in the Civic Center were a big experiment. I had visualized a big area of red color in the fall and the red oaks were available. We got them from a nursery in Pennsylvania, in late April, when the buds were white and two inches long. I was sure we were licked, and I knew who would get the blame.

We planted the trees anyway, hauling them from the railroad car a dozen at a time so we would not have to heel them in. They certainly received all the care in watering, staking, and fertilizing that we could think of. I kept a notebook on them, writing it down if one showed signs of growing. I did not know that inadvertently we had struck a period which is best for transplanting trees. When the buds are swelling, transplanting is safest, although it is the most dangerous time for the roots to shrivel up. Out of the whole lot, we lost only two trees.

Frederick Law Olmsted (1822-1903) With Calvert Vaux, he designed Central Park in New York and supervised its construction. Architect in Chief of Central Park, Commissioner of Yosemite and Mariposa Big Tree Grove, designer of Prospect Park in Brooklyn, Mount Royal – Montreal, Back Bay Park – Boston, World's Columbian Exposition – Chicago, Capitol grounds – Washington, D.C., and many others. He is recognized as "the founder of the profession of landscape architect in America."

Frederick Law Olmsted (1870-1957) Son of the Frederick Law Olmsted of Central Park fame. Began practice as a landscape architect in 1895. Major planning projects included Metropolitan Park System of Boston, Baltimore Park Commission, and the National Capital Park and Planning Commission. Director of California's Park Commission. This is the Frederick Law Olmsted who made plans for Denver's Civic Center and its Mountain Parks.

Arnold W. Brunner. Architect of the Cleveland post office and other public buildings.

Edward H. Bennett. San Francisco architect. Made city plans for Minneapolis in 1911-17.



Ash trees had been planted between the oaks, according to the Olmsted plan. They grew, and while the oaks were slowly developing, the ashes were already green.

Today, as I look at Civic Center's fully grown groves of hardy oaks, I am disgusted because they do not have the bright red color we had hoped for. They are a mahogany brown, and not spectacular.

Capitol Building Grounds

When the State Capitol Building was finished, in the 90's, it was decided to plant around it every variety of tree that would grow in Colorado. Reinhard Scheutze planted the grounds. It was an interesting collection of trees and has been very helpful to us all through the years. A lot of the trees have died and some were removed to open up a vista to the City and County Building.

Boulevard F – Federal Boulevard

Most of our planting activities had been in the eastern and southern parts of Denver and the people in North Denver felt that they had been ignored. George Olinger was park commissioner for North Denver and in 1915 he got us to plant trees – American elms – on both sides of Boulevard F – Federal Boulevard – from Colfax to 46th Avenue. Mother Cabrini was so anxious to get trees planted in front of the Queen of Heaven Orphanage, of which she was the head, that she came to the park office to ask for them, saying she would dig the holes. Next morning I drove by there in my buggy; sure enough, a number of little girls and a few nuns were digging in the hard clay. I had visions of much troublesome publicity in the papers, and I told them to quit. By one o'clock we had a crew of men digging the tree holes in front of the orphanage.

City Park

While the work on the parkways and streets was progressing we were also developing the major parks. City Park had been partly planted, using Reinhard Scheutze's plan for the area east of the lake. The west end of the park had been planted in the 90's by, I believe, private citizens who donated trees, and by school children. I found a plan of that area in the park files; I have never seen a landscape plan like it!

The whole area, from York Street to the duck lake, was a maze of concentric circles with trees bordering the circular roads. It was based on horse-and-buggy driving and you could drive from one circle to another. Imagine a large park with miles of silly roads and walks, trees everywhere,

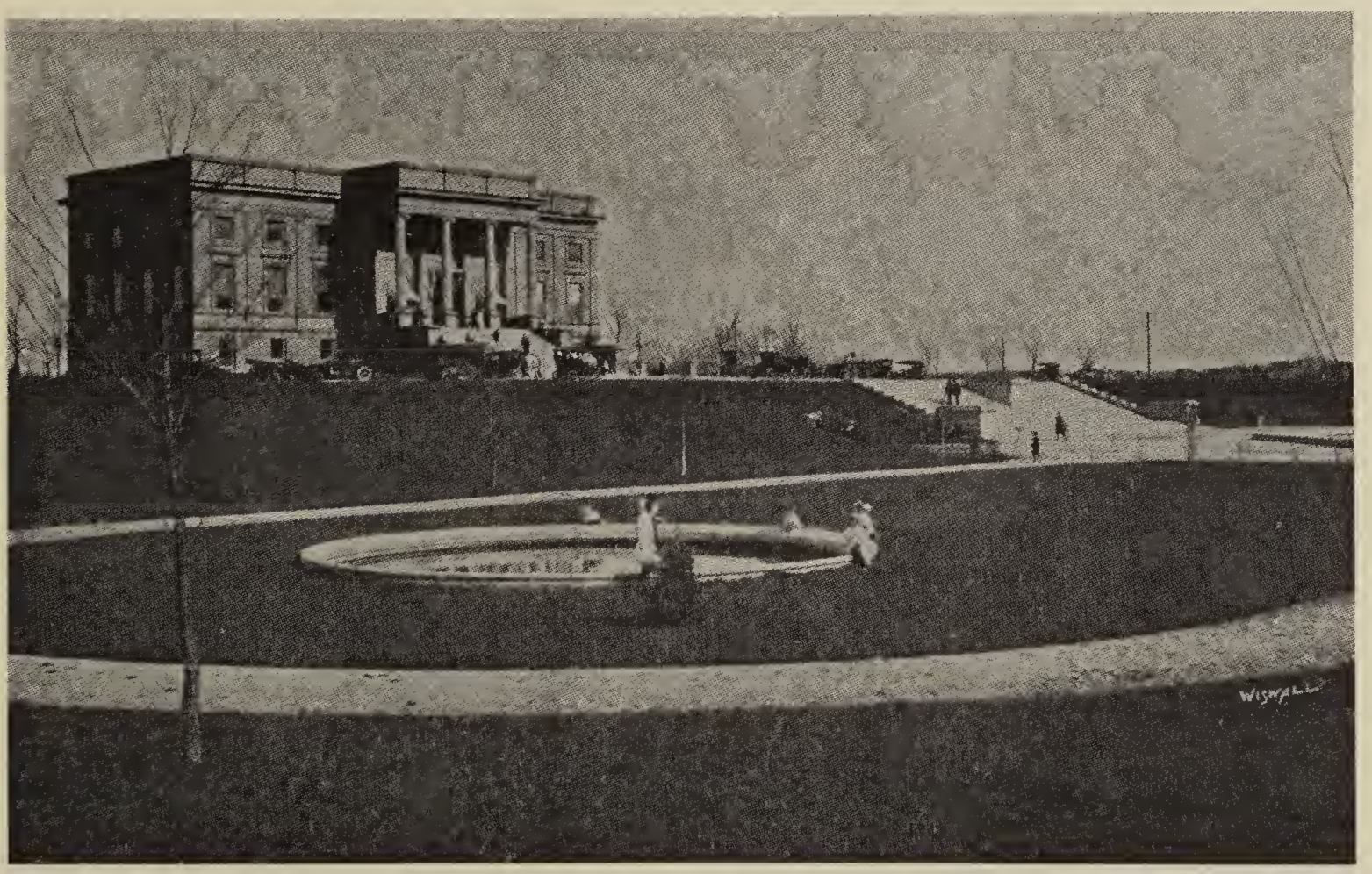
and no open space. There were many ridiculous S-shaped walks, the edges of which had to be hand trimmed.

It was no easy matter to create the open lawns we have today. The citizens were so proud of their work that we had to remove the elm and maple trees during snowstorms to avoid criticism. Three or four miles of unnecessary roads and twice that many miles of paths were plowed up. Criticism stopped when the big sloping lawns became apparent. Large groups of people began to use them. The west end of City Park became very attractive, with big open vistas. I claim credit for that, but I sure caught hell when we cut down those trees.

The eastern end of City Park was slower in developing. The Carter Museum of Natural History had been located there and that part of the park designed around it. There was an entrance at 17th Avenue and Colorado Boulevard. I got rid of that, replacing it with curved roads designed for slow traffic. We opened 23rd Avenue and widened 17th Avenue so that traffic could go past outside the park.

In the middle of City Park, near the service buildings, a small zoo had sprung up. Alfred Hill had started it with a few animals. It grew little by little. In 1917 Victor Borcherd built the artificial mountain in the bear pens. It was the first barless cage area in western zoos. He took impressions of the rocks near Morrison and set them up in the zoo, pouring concrete of natural rock color in the forms.

He had other plans for the zoo but when interest at City Hall died down, he went to St. Louis and built similar structures there. In St. Louis the same thing happened, and after two years he came back to Denver. Soon after, when I came back from a meeting at Cleveland, I found that



CARTER MUSEUM, CITY PARK
1913

Vic had shot himself. Poor Vic. He was a true artist. He had designed naturalistic settings for the museum in City Park which were the forerunners of the great ones there now.

Washington Park

With the building of Washington and Cheesman Parks, City Park lost some of its glory. The parkways and large parks pulled development their way.

When I began to work in the parks, Washington Park had the two lakes that are there now. Park development was around the superintendent's house. Adam Kohankie, appointed superintendent by Speer in 1905, was a very capable man, and Denver owes the beauty of this pet park largely to his work. We worked together closely, I doing the paper work, and Adam directing construction. There was some criticism about the city furnishing Adam a house to live in, but the fact was that living there kept him on the job 24 hours a day.

The big lawn had been put in; an expensive project. Horse drawn mowers came along at this time. Automobiles had begun to use the park roads, and the city put a row of heavy posts along the edge of the lawn to keep motorists from cutting across.

During the interval between Speer's administrations the parks were under a commissioner. City Hall complained about the expense of putting in the big lawn in Washington Park and stopped the work. Both the south and north ends remained in prairie. A swimming beach and bath house went in but no more park lawn.

Planting trees at the north end of the park was a problem. The commissioner said, "No, leave this alone. We've got parks enough." Harry Raymond, the secretary of the commission, who lived near the park, said, "Go ahead and plant it." I had a plan and the plant material, so we planted it. The trees were collected and carried by hand from the trucks.



FREE FISHING IN WASHINGTON PARK LAKE
1913



VIEW OF THE ROCKIES FROM CHEESMAN MEMORIAL, CHEESMAN PARK

The commissioner never noticed what we were doing. Evergreen Hill is there today, the only nice planting of evergreens the park has.

When Speer came back into office, we were still working on the north end of Washington Park. The engineers had figured out a curving road there mathematically, with degrees, and had staked it that way. It looked like heck; no flowing curves. So, one day, after five o'clock, John Duninger, who was helping me, and I, pulled out the engineers' stakes and flattened out the road curves to a nice flowing line. The mayor approved it.

Cheesman Park

Cheesman Park was originally a government cemetery. It existed when I came to Denver although there was no burying there any more. Negotiations to turn it into a park were under way. The north end was already planted and I planted the south end. A lake is part of the design for the northwest corner of the park but we never got water for a real lake. It has always been a dry lake; kind of interesting with its grassy slopes.

I tried my darndest to take away the monotony of all plain lawns in these big parks. There is variety in the north and south ends of Cheesman.

Some wealthy homeowners, next to Cheesman Park, wanted the planting removed so that their homes would face on an open park. I explained to Otto Thum, the commissioner in charge of parks, that we should leave it alone. "We have finally," I said, "with a lot of work, gotten a park on the go." "All right," he said. He was a good man. Later on, we compromised. I made some openings in the planting so that the neighbors could look in and their homes appeared to be part of the park.

Inspiration Point

Although the city had no legal right to buy land outside the city, Mayor Speer went ahead and purchased the high bluff called Inspiration Point, saying, "I'd be willing to go to jail for it as long as the people of Denver got the use of it." The beautiful outlook from The Point is one of Denver's great attractions. Part of the land there has been planted with a forest of yellow pines so that no grass is needed.

Mountain Parks and Roads

The original idea for a Denver-owned mountain preserve came from Robert Speer, I believe, but it was promoted into a reality by two committees: one from the Real Estate Exchange with K. A. Pence as chairman, and one from the Chamber of Commerce with Warwick Downing as chairman. The two committees worked together for several years.

There were legal complications. The State Legislature had to authorize the city to acquire land outside its corporate limits. Most of this mountain land west of Denver was federal land subject to homesteading. It was necessary for the federal government to withdraw it from homestead entry. Only then was Denver allowed to select the land it wanted at the rate of $1.25 per acre, the price for homestead land. Denver never made a more profitable deal, for this land is probably worth thousands an acre now.

Most of the mountain parks development came later but we did get the mountains opened up with roads. The road up Lookout Mountain was first planned and surveyed by Frederick Law Olmsted of Boston. The Olmsted plan was ignored.

I started working on road surveys in the mountains shortly after I went to work for Denver. During the winter time the engineers of the park



SKI JUMPING IN BERKELEY PARK
1913



PANORAMIC VIEW FROM LOOKOUT MOUNTAIN ROAD, DENVER MOUNTAIN PARKS

office were on the survey of the Lookout Mountain road. Fred Steinhauer, superintendent of parks, was chief engineer, with Ed Smith, later city engineer, under him. I remember distinctly how we staked out the road, taking care to protect the natural scenery.

We showed off the new road when we hosted the national meeting of the American Institute of Park Executives in 1913. There was a trip up Lookout Mountain, then one lane, but with good grades. Many of the cars had to stop for water at a well in one of the turns of the road. After a trout dinner in a tent on top of the mountain, the parade of cars followed Denver Parks' roads to Bergen Park and Evergreen, then down the old Bear Creek road, which was narrow and plenty dizzy in places, to Morrison.

We had a road up on Genessee Mountain in 1913, I think. The Mount Vernon Canyon road came much later, of course.

How the Elms Came to Denver

In those early days there were very few nurseries. The two outstanding ones were George Brown's and the Northern Nursery. But there were tree salesmen, nevertheless. One of them had connections at the mayor's office; in fact, he was nothing else but a ward politician. He got a big order. The trees had already been bought and shipped when I came in the picture. That's how Denver got so many elms. I picked out a few good ones and threw out the mess of poor ones. We had a battle. I won; the mayor supported me. I always thought the city should have sent me to the nurseries to pick out the trees.

That same year, Speer arranged to give forty or fifty thousand little trees to the people of Denver – a limit of three trees to each person who

came for them. We had the trees heeled in at Curtis playground and I stood over the operation and threw away the worst culls. The people were so tree-hungry they would get their three trees, take them away, and come back again for three more. They were elms and soft maples mostly. That's what we distributed and that's what we planted along 17th Avenue, Sixth Avenue, Monaco and Speer Boulevard. I realized when we were doing it that we were planting too many American elms. It's dangerous for a city to plant too many trees of one kind. The trees are sixty years old now and some of them are the elms which are being cut down now. From Downing Street, you look down a stately line of trees on Speer Boulevard to the mountains. I hope the darn bugs will spare those trees. I'm more afraid of the human bugs than the animal ones.



ALONG THE MARION PARKWAY TO WASHINGTON PARK

Most of the trees which were not elms or soft maples, in the older parkways and parks, were varieties which I introduced. The black walnut was one of them. Another was the black locust, which was a good tree but the worms finally wiped out almost all of them. Few black locusts are left.

Experiments on Marion Street

We worried about having too many elms, so we tried out many other kinds. Marion Street, from Cherry Creek to Washington Park, was made a parkway with the city ditch running as a little rivulet down the center parkway strip. Later, the engineers put the ditch in a pipe and covered it over. Despite my protests they had eliminated the item of interest – flowing water. We tried out several kinds of trees on the Marion Parkway.

Because one sycamore, *Platanus occidentalis,* in Washington Park, looked hardy, we planted sycamores for two blocks. In spite of the dry sandy soil they did well.

In the next two blocks we planted hackberries that the city bought from George Fragert who was a politician and had the ear of the mayor. The hackberries came in a carload lot and were beautiful straight-trunked trees with few roots. Adam Kohankie and I planted them and they leafed out fine. The first winter they all died. I didn't dare tell the park office that they were all dead; I thought my job depended on those trees. If it wasn't for the fact that there was no one else in the park department who knew about plants, I probably would have been fired – for having ideas, you know. It's dangerous.

The hackberries that died were from the lowlands of Mississippi, not suitable here. Adam and I didn't say anything about it. We bought the other hackberry, *Celtis occidentalis,* and went out and pulled the dead Mississippi trees, one at a time, smuggled them away, and replaced them with good hackberries. They are there now.

In the third two-block stretch we planted black walnuts and Carolina poplars, alternately in the rows. The wlanuts came out later and were replaced by red oaks.

The block from Cherry Creek to Third Avenue, on Downing, was made a parkway, planted mostly in Eastern white pines. At that time the white pine blister rust was doing much damage in the East and the Department of Agriculture put out an order to destroy all trees of this kind. Our white pines were not discovered by the inspector. The mature trees are there today.

Park Men

In the early park program, I did all the horticultural work. No one else, except Adam Kohankie, who came from Ohio, knew anything about trees. Later on there was John Berry, from Colorado Springs, and John Land; they knew something of horticulture.

During the "teen" years, we organized a horticultural, or plant identification, class in the park department. Two young men in that class went on to successful park careers. Russell Ellenbaas became superintendent of Washington Park.

The other, George Carlson, worked with me during much of his career. For many years he was with me in private practice, supervising actual construction and planting on my plans. Later he was superintendent of parks for Colorado Springs and general superintendent of Denver parks. He certainly was a very capable man.

Flower Show

Although we were working for the Denver parks only, we were interested in promoting horticulture over the whole state. Gus Klaiber had



Top: Alec Graham, Sunken Gardens; Dr. C. P. Gillete, Colo. Ag. College; G. A. Klaiber, City Forester.

Middle: Joe Herter, City parks; Carl Aude, Montclair parkways; Emil Fuerter, Gardener; Russell Ellenbaas, Parks foreman.

Bottom: Wm. Zellers, Gardener; Robert R. Forest, City nursery; Paul Oske, Nurseryman; Unknown; Unknown; "Deafie" Smith, Highland Park; George Carlson, City parks; Mr. Patrick, Park Floral Co.; John Berry, Supt. of Parks; Mr. McIntyre, Berkeley Park; S. R. DeBoer, Landscape Architect.

One-half of a picture of Horticultural Pioneers taken in 1912 at first meeting of Denver Society of Ornamental Horticulture. Full picture, loaned by George Carlson, appeared in The Green Thumb, September, 1948.

been appointed city forester. He and I hatched out the idea of a flower show. A chrysanthemum show in the fall, we thought, would be a tremendous thing. Mayor Speer was enthusiastic about it.

We went to see the florists about it. The first one, Al Mauff, told us that it was too late. "You have to begin a year earlier to grow them," he said. Then we went to John Valentine at Park Floral and he agreed that we needed a year to prepare the show. "But," he said, "if Mayor Speer is interested in this, I'll empty the whole darn greenhouse to please him." So we had one florist. We went back to Al Mauff and Al said, "Dammit, if Valentine can do it, I can too!" That's the way the first flower show was organized.

We had a pretty good flower show, in November, 1912, I think, and all of it came out of the florists' shops. The show was held in the auditorium because Mayor Speer was anxious to have activity in the new building which was barely finished. Even at that time Mrs. Morse, now Mrs. Garrey, was on the committee. She and I are the only old timers left.

The flower show was held annually for several years and the committee managed it. Finally, the florists got together and decided that they had really been putting on the show while the committee got the credit. So the florists staged the next show themselves. At the end of it, they got into a scrap, a real battle over who was doing what, and that was the end of the flower shows.

Speer Comes Back Again

Robert Speer was out of office for several years. The mayors who served during that time were nothing, and only showed that the city needed a firm hand to direct it. In 1915 Speer returned to office. Although he had been the most despised man during the previous administration, he was elected by a vote of 2½ to one. And Speer's new city charter was approved. It gave much executive power to the mayor, including the power to appoint all administrative officials and some councilmen. This charter, somewhat modified, is still in effect.

I was elated over Robert Speer's election but got a shock when I received a letter from W. F. R. Mills, the Manager of Improvements and Parks, to the effect that my services as a landscape architect were no longer needed. I began thinking of setting up my own office for private practice. Then I was called to Mayor Speer's office. When I got there he demanded, "What happened to you?" "You fired me," I said. "No," said Speer, "I didn't know a thing about it." So, the next day, at the park office, Mr. Mills took me into a corner and apologized. "I didn't know what a landscape architect was," he said. I went back to work and got a raise in pay.

In the midst of his new program, Robert Speer died, on May 14, 1918.



George Carlson and Denver park men on 1916 spraying equipment.

IV

PRIVATE PRACTICE, EARLY YEARS

WORLD WAR I slowed down the park work in Denver, but all of us were busy in some kind of war work. I was not drafted for military service because I had two children. To contribute to the national effort I wrote promotional articles for the government public relations agency, working under George Sanford Holmes, formerly editor of the Rocky Mountain News and Commissioner of Safety for Denver. Denver remembered him for his efforts to take guns and nightsticks away from the police. My articles were translated, one into 26 languages, for distribution in allied countries.

When the war came to an end, in 1918, Denver went wild with excitement. I remember that Walter Pesman, Van Oostern and I had our pictures taken acting like we were drunk, which we were not. Anna Beth was hard to convince; she never forgave me for that picture.

By this time I was constantly being asked to do some private landscape designing. It was something I had wanted to do and expected to do some day. In 1919 Walter Pesman and I opened an office in the Tramway Building. Pesman was in the office most of the time; I continued with my park work for the city.

The park office was kind of uneasy because I was doing private work besides my city work, so I quit the city. About two months later they hired me back again, with an increase in pay, and I continued as landscape architect and park consultant. This engagement with Denver lasted from 1920 until 1958.

The first private work I did in Denver was a garden plan for A. C. Foster who had a fine home on a 160-acre farm. The next, I think, was for Dr. DeWitt's place up on the Morrison Road. I had an attractive and condensed garden plan for that. Then I made a beautiful plan for Mrs. Verner Z. Reed for her place on Circle Drive. There were others, all elaborate gardens.

New Home in an Old House

It was 1920 when our family moved into the old farm house on a five-acre tract in South Denver, under the city ditch. I had purchased the land the year before. The house is probably one of the oldest houses in South Denver. It took a lot of work to make it livable and I still work on it.

We remodeled the chicken house into an office, put a pergola in front of it, and a garden in front of that. My thought was that, being on the

Mrs. Verner Z. Reed Estate – DeBoer design



The office of S. R. DeBoer on E. Iliff Ave., Denver

city ditch, we would have enough water to make a small show garden as a build-up for a landscape design office. For a while I had two gardeners. When that proved to be too expensive I cut down to just one, and later on we had to do the work ourselves.

There were big cottonwoods on the place, planted at the time the city ditch was built. One of them was, I believe, the tallest tree in Colorado – 112 feet tall. It is still there but it is slowly dying. We were happy in the old place. The pergola attracted much attention and its photograph was printed in a Paris garden magazine.

The office building was designed by Lester Varian but he didn't put in the tower; he thought it would be too expensive. I designed the tower myself, basing it on my memory of the tower in our home town of Ureterp, in Holland. When it was built, Lester Varian approved of it. The bricks of the office building are laid in a kind of wavy line, something the bricklayer didn't appreciate. And the roof shingles were also put on in wavy lines. There were people who thought I had been cheated by drunken workmen, but that's the way I wanted it.

The building was finally completed in 1930 when there was little work for anyone. A bricklayer and helper did the last job at five dollars a day. Today they each get more than that for an hour.

English Interlude

In 1922 I was invited by Thomas Mawson, the top city planner in the world, to work in his office for a while. I had to pay for the privilege. The Olmsteds in Boston had done some tremendous work on certain tracts of land, like Central Park in New York; Mawson planned whole cities.

I studied with Thomas Mawson for three or four months. He was too busy to show me much, but his staff in Lancaster showed me everything in the office. I saw it all and studied it all. I discovered that Mawson was behind the times; he was still an old-fashioned city planner and landscape architect. His park plans were independent of the plan of the city. He designed curving line subdivisions and he designed the central part of the city, but the atmosphere was narrower and smaller than the American idea. I had learned something more advanced in Denver. I had learned from John Nolen's book that a correct city plan must consider water lines to the homes, and sewer lines from them, and roadways for fast traffic. I had seen the vision of integrated planning for the future.

At that time I was asked to do the planning for a big park in Rotterdam. They were turning the Alexander Polder into a park. I hesitated about

Thomas H. Mawson (? - 1933) Founder of firm of T. H. Mawson & Sons, London and Lancaster. Articled to architectural profession, turned by preference to arboriculture and horticulture, then practiced as landscape architect and town planning consultant. City plans for Athens, Salonika, Calgary, Banff, Vancouver, Bolton, Northampton and many others. Author of *Art and Craft of Garden Making, Civic Art, Bolton – A Study in Town Planning, The Life and Work of an English Landscape Architect.*

that job. Finally Anna Beth and I decided that we wanted to go back to Denver. Holland is a pleasant land but it's crowded with people. And, we knew, things had changed tremendously since we left it.

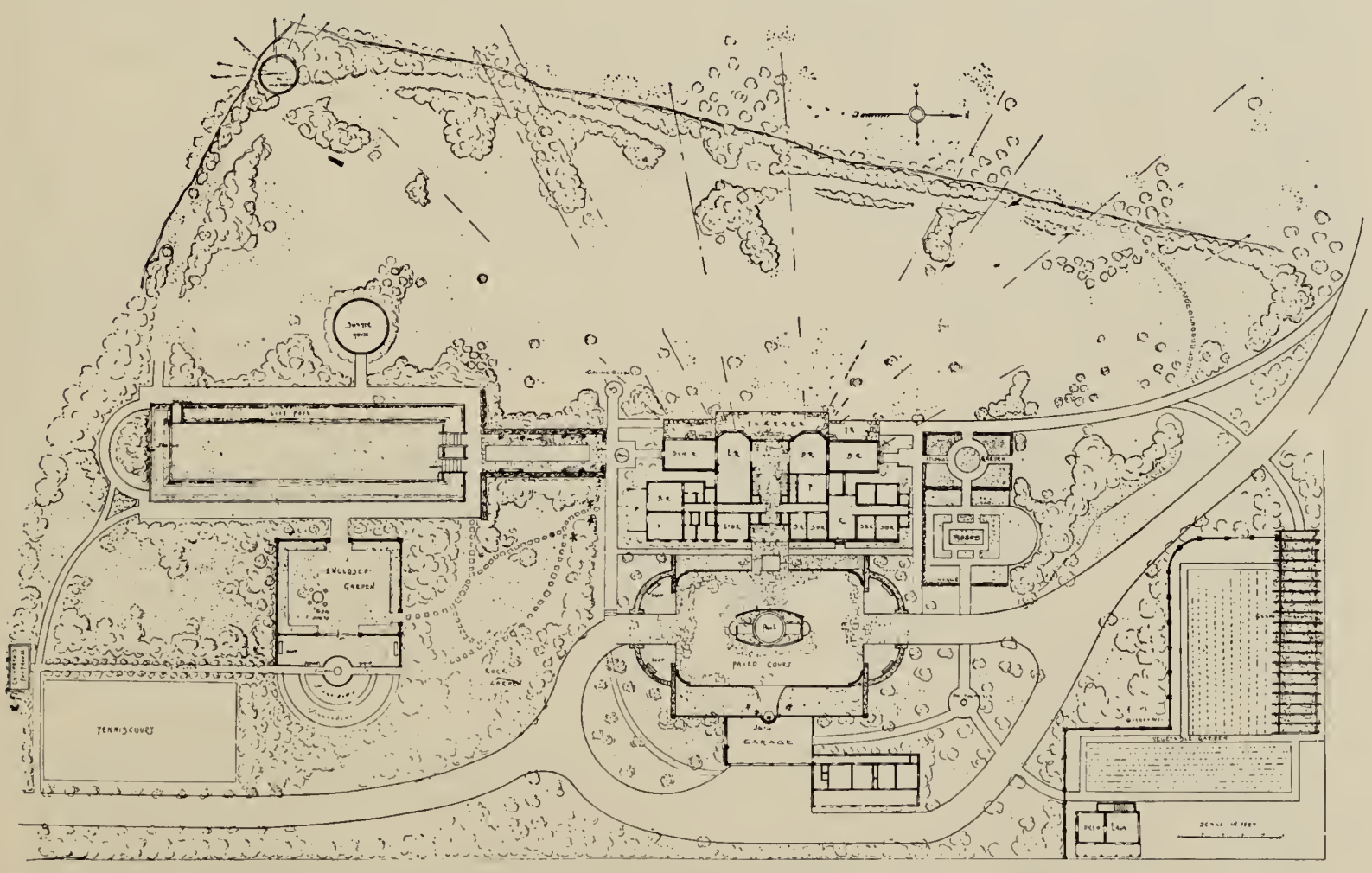
Some Planning in Denver Area

Back in Denver I was very busy with landscape work. George Carlson came back from the war and joined me. Denver was growing and there was a lot of building. We had much to do in the new Cherry Hills Country Club area. We made the plans for the Cherry Hills area – the master plan for the Village. Much later I did the planning for Greenwood Village.

We did the first planned landscape subdivision in the Denver area – Glen Creighton, out on West Colfax, near Wadsworth. A small tract in North Denver had curving streets but, otherwise, Denver had the dead rectangular layout that nearly all cities have. Mr. Creighton was a farmer, and he had us lay out his 80-acre farm. We laid out the subdivision in a landscaped way, like no other in this region. When it was staked out Creighton wanted more land in the lots, so he narrowed the streets from 50 feet to 30 feet wide, with no sidewalks. That's the way they are today.

We designed Bonnie Brae, where again I tried my darndest to get away from Denver's monotonous block system. I had in mind a plan for Denver which included a curving diagonal street from Speer Boulevard southeast to Colorado Boulevard. Bonnie Brae Boulevard, east of University, was part of it, but the rest never happened. That boulevard has proved to be valuable.

Although we had lots of work we didn't prosper. I had put my inheritance from my family into our business but, in spite of all our work,



Development Plan, A. C. Foster Estate by S. R. DeBoer

the books showed a continuous loss. Finally, in 1924, Pesman and I separated and he took over our Denver school contract which was the best part of the business. I went on building cities.

Grand Junction Plan

My consulting arrangement with Denver made it possible for me to spread out and do planning work in other cities on a private basis. I was working in Denver on zoning, which began in 1925, but for some time had had a new view of overall city planning. When, in 1926, Ed Thompson, the city manager of Grand Junction, came to me, I agreed to make a plan for that city.

The plan for Grand Junction, as we conceived it, was a daring and pioneer plan. I think it was the first time in the West, or maybe in America, where city planning was extended into all the city's trade territory. I had a chance to try out my ideas.

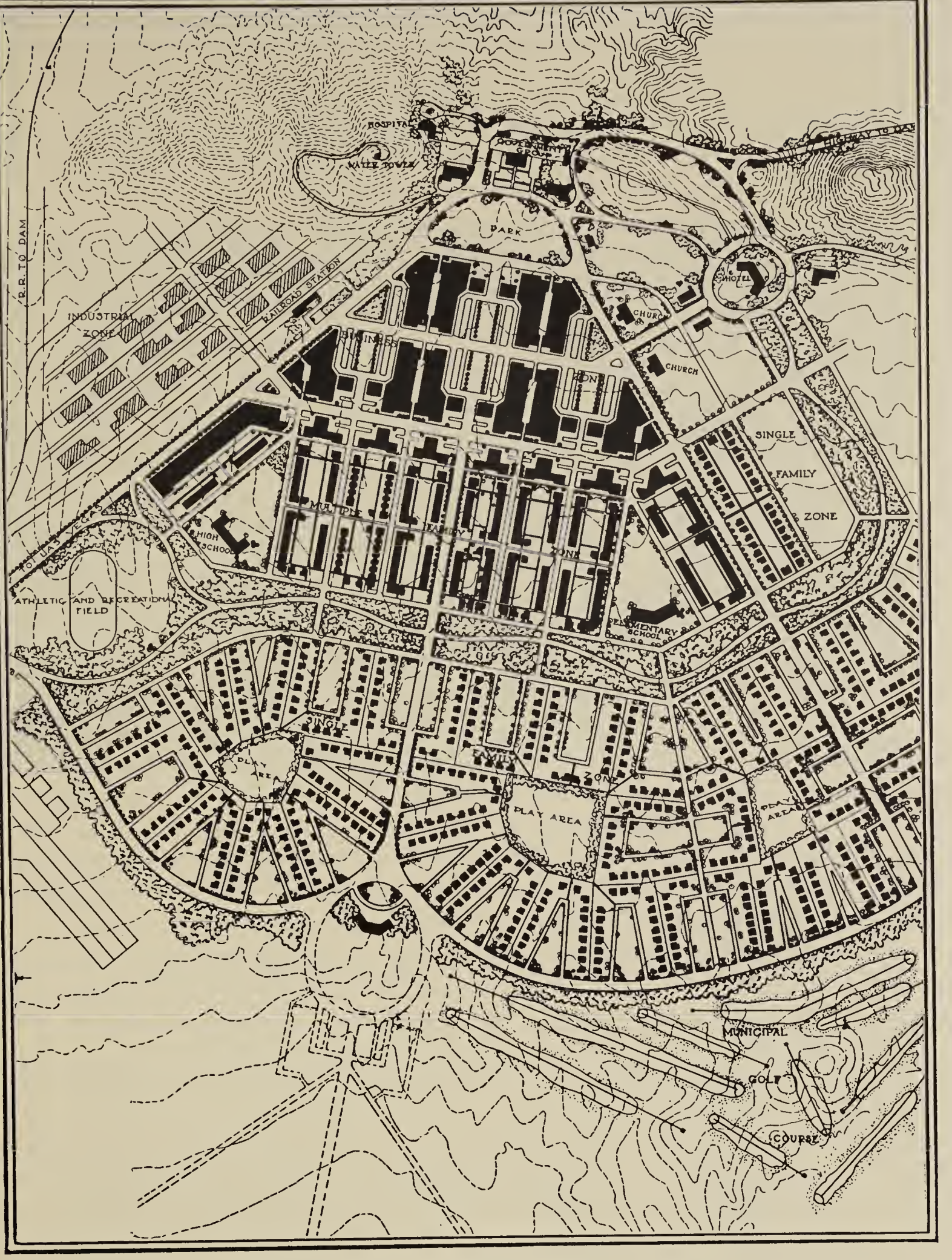
We began the study by analyzing the elements of the whole territory. What was there that could lead to employment and stable citizenship? How large was the territory? How many people? And what did they do? Things like that. We talked to the merchants and learned about their customers, some of whom came from a long way off, once in a while, to buy a half year's supply of goods. We mapped a circle of 150 miles radius and spotted the forests and mineral and other resources on it. The map showed tremendous coal deposits and, of course, the famous oil shale mountains along the Colorado River. We saw that the oil, when developed, could supply the whole world with oil for many years, and would make a big city out of Grand Junction. We considered the value of the scenic areas, such as Glenwood Canyon, and their attraction to tourists.

With all this information accumulated and mapped we applied our findings to the city and planned what it needed for development. We planned farm-to-market roads and connecting roads, the beginnings of a master transit and highway network. We planned for tourist encouragement by business and cultural centers. Part of the plan was a parkway along the Colorado River.

Working on this, we saw the need for a statewide planning project. We saw that Colorado would benefit from a slow speed, indirect highway, perhaps from Grand Junction up Glenwood Canyon, to Kremmling and Hot Sulphur Springs, Grand Lake, the Trail Ridge Road and Estes Park, to Denver. Such a road would not replace the high speed freeway, but would be auxiliary to it.

For Grand Junction we prepared a zoning plan, based on the Denver ordinance, but simpler.

The plan received wide attention, and led to my employment by the government at the creation of Boulder City.



GENERAL PLAN – BOULDER CITY, NEVADA

Boulder City

I designed Boulder City (in Nevada, at Hoover Dam) about 1930. I went out there and scouted the whole area where the dam was going to be built with the Bureau of Reclamation engineer on the job. After studying the topography it was clear that there were five possible locations for the townsite. There was only one I could stick a shovel into, all the

others were too rocky. That's the site we picked. Trees did grow there, although it was necessary to haul in a lot of soil. Today, Boulder City is a green spot in a thousand miles of nothing.

My Boulder City plan is V-shaped, with the point at the north on high ground, with a view of Lake Mead. From the point, the streets radiate out to the south, with the residential area in the wide part of the V. The shopping center is located around a park in the center of town. South of that is a multi-family dwelling area, and then the single family area. Around it all I planned a green belt, with an industrial area and room for a golf course, more homes, and other expansion outside the green belt. On the west side of the plan runs the railroad. That is the plan, but that isn't what is there.

President Hoover got excited over unemployment and ordered the Bureau to begin building the dam before the specifications were worked out. The contract was let and work began before my plans were ready. I made a tentative report and plan but, as I drew it up, I got other ideas and began to revise it. By gosh, Reclamation was so anxious to get going that they went out and staked out a plan that wasn't mine. Dr. Elwood Mead, the commissioner of the Bureau of Reclamation, made a trip to Washington and when he got back the stakes were pulled up. My final plan for the city was then approved and staked out on the ground. And that's when things went wrong.

As you know, a number of big contractors went together to undertake the Boulder Dam job (Six Companies, Inc.). The first thing they did was to put up a big general store on the railroad, about half a mile from the planned shopping center. Then other businesses came along and built store buildings next to the first one and pretty soon the business district was established there, not where I had planned it.

So, the planned shopping center in the center of the town, rimming a park, is not there. About four blocks of that ground are vacant with only a city hall in one corner. The center of the town is dead. The school, which was to be in the residential district, is in the unplanned commercial district. I have been unhappy about this sad situation for a long time, particularly because the wrecking of the plan was done under the eyes of one of my own engineers. Anyway, the government offices were actually built in the space designed for them, up at the point of the V. The green belt exists to a small extent, although there is a hospital in part of it.

My plan for Boulder City was for a model city. Although it didn't become a reality it was a good plan, I think, for its time. Today, with all the people on wheels, I would probably do it differently.

Estes Park

The Estes Park area work must have been in the 30's. We did an awful lot of work there. We made a subdivision layout for the grounds around the Stanley Hotel, and another for a place on the other side of the

creek, and a layout on all the west side of Estes Park, and on the road south to Ward.

We did work for the towns on the plains east of Estes Park – Longmont, Loveland, and Fort Collins later on, and Greeley. I made the Greeley zoning plan.



The following list of projects done in Mr. DeBoer's early years in private practice is not complete. It comes from pictures in the DeBoer home and from the index of "The DeBoer Papers" at the Western History Department of the Denver Public Library.

Charles Gates Home, Bear Creek	About 1920
John Gates Home, Denver	About 1920
W. R. Owen Residence, Cherry Hills	1920's
F. M. Mayfield Estate	1920's
Mrs. Verner Z. Reed Estate, Denver	1920's
A. C. Foster Estate, Cherry Hills	1920's
Thomas H. Powers Estate, Colorado Springs	1920's
University of Denver, Development Plan	1923
Johnstown, Colo., City Plan	1926
Trinidad, Colo., Study of Need for Junior College	1926
Park Lane Square, Denver, Development and Landscaping	1926
Grand Junction, City Plan	1927
Greeley, Colo., Zoning Study and Ordinance	1927
Colorado Women's College, Denver, Proposed Development	1927
Boulder, Colo., Zoning Study	1927
Estes Park, Colo., Development Plan for Eagle Rock Residential Area	1927
Estes Park, Colo., Development Plan for Stanley Estates	1927
Boulder City, Nevada, City Plan	1931
Colorado Springs, Plans for Restoration of Monument Valley	After 1935 flood
Longmont, Colo., Zoning Plan	1939
Boulder, Colo., Zoning Ordinance	1939
Arapahoe County, Colo., Zoning Plan	1939
Englewood, Colo., Building Code	1940
Englewood, Colo., City Plan and Zoning Ordinance	1940

V

DENVER PARKS AND PARKWAYS
The Stapleton Era

THE two men who were responsible for Denver's parks and parkways were Speer and Stapleton. When Benjamin Stapleton became mayor in 1923 Denver could not have had a better man for the continued development of its park system. He was the logical successor to Robert Speer. He had followed our work closely during the Speer years and when, after eight years of being postmaster, he became mayor, his program was ready. He appointed Charles Vail his Manager of Public Works and Parks.

Much of the Speer plan had been carried out, and Stapleton began to purchase land for more parks. His purchase of Red Rocks Park was severely criticized. One daily paper referred to it as Stapleton's Rattlesnake Park. It was one of the best investments any city ever made.

In spite of criticism the mayor went ahead and bought Manhattan Beach at Sloan Lake and put in a boat harbor there. He also purchased land north of Berkeley Park for the Case golf course. The airport land was acquired in the 30's, when Denver was first on a main airline. We had Roxborough Park on our list, and the mayor offered $15,000 for it. The owner wanted $17,000 and the deal fell through. The land was finally bought by a private developer and is now being cut up into a fancy real estate subdivision.

Alamo Placita and Arlington Park

When Speer Boulevard was built on the northeast side of Cherry Creek, there was a swampy area of old creek bottom left over, north of the boulevard at Ogden Street. It had a beautiful grove of old cottonwoods on it. Under Stapleton, we made a plan for a park there, preserving the old trees. Part of the low land was planted in a formal design with low hedges and beds of flowers, intended to be seen by motorists on the boulevard. Today's traffic is so fast that the motorist has no time to observe anything but his road, and this type of design is no longer practical.

Eli Gross, Superintendent of Parks under Stapleton, gave the park an appropriate name. Alamo Placita – Little Place of the Cottonwoods. This park, together with Arlington Park on the south side of the creek, marks the eastern end of the Cherry Creek, or Speer, Boulevards.



Denver's Civic Center before construction of City and County Building

Civic Center Again

The city got a donation for a bit of a fountain and I wanted to put it in the intersection of the two axes of Civic Center. Burnham Hoyt, the architect, with other ideas, had a prominent sculptor draw up a plan that would have torn up the trees and everything. We had a battle. I refused to let them spoil the Civic Center plan. So, Stapleton took the money, a hundred thousand dollars, and put up a small building on the Denver General Hospital grounds.

About the most important step in the development of the Civic Center was locating the new city hall – the City and County Building – there. Mr. Isaac Keator was chairman of a special committee of the Planning Commission which acquired the block of ground on which the building was located. The city government did not want an outsider to design its most important building. It wasn't just sentiment. It was recognized that an outsider wouldn't understand Denver's special conditions of soil, water, air, and sunlight. Mayor Stapleton decided to give the job to all 29 architects in Denver. They formed a committee and hired an outsider to make the design which was used. The building was completed during George Begole's term as mayor.

Barnum Boulevard

The parkway program had mostly covered East Denver where the well-to-do citizens lived, and North Denver had gotten very little of it.

To correct this we worked out a plan which served the whole northern district and fitted into the plan of the city. We planned a boulevard running from Barnum Park (West 4th to 5th Avenues, Hooker to Julian Street) to Sloan Lake, then north to Berkeley Park and along West 46th Avenue to Rocky Mountain Lake Park, then to Argo Park and past the stockyards and on to Montclair, tieing in to the East Denver parkways. South from Barnum the parkway would connect with the Platte River plan and run to University Park along Harvard Gulch. It would give Denver a tree-lined boulevard around the whole city. We also planned an extension of Speer Boulevard to Berkeley Lake, Arvada, and Coal Creek Canyon.

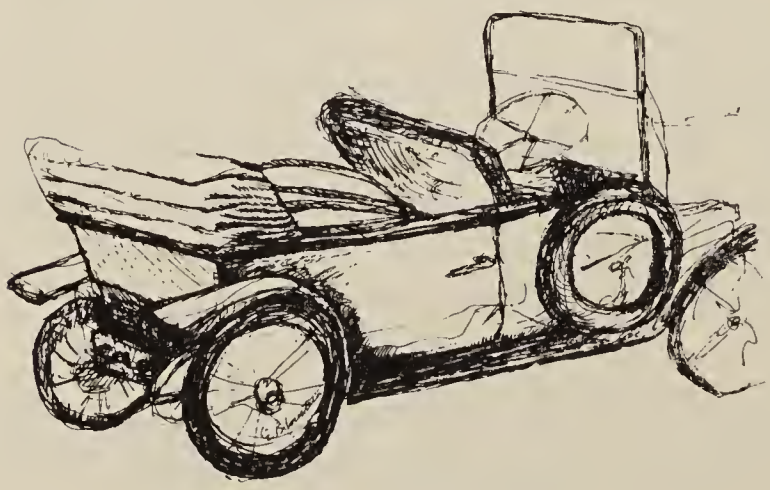
I still think it was a valuable plan, but did we get criticized! At a public meeting in the Berkeley School I caught it. The chairman gave the gavel to the vice-chairman so he could talk with freedom. And he did! It was the days of the Ku Klux Klan, and his complaint was that we had connected Regis College campus to our parkway – a religious move to give more power to the church. I pointed out that the plan also connected with Denver University, Colorado Women's College, a Baptist school, and with Barnum and Sloan Lake Parks. I got out alive, but they stopped the program right there. The next meeting was in Barnum and we expected an attack. Mr. Vail went along, bringing his chauffeur who was a plain-clothes policeman. The chauffeur told me that "the boss thought you might need some protection." Nothing happened. But our ambitious parkway plan never became a reality.

Sloan and Cooper Lakes

Sloan and Cooper Lakes used to be separated from each other by a heavy dam and road. The dam was cut to make the largest body of water in Denver, big enough for power and sail boats. The Tennyson Street entrance was closed and the north end of the park developed for playgrounds. Traffic was detoured around the park, and parking places put in at the boundaries. The boat harbor and boat house were built.

Roads Through Parks

As automobile traffic increased in Denver we began to make plans to keep it out of the parks as much as possible. There had originally been



Mayors of Denver, Speer to Stapleton

Robert Speer 1904-12
Henry J. Arnold 1912
Dr. J. M. Perkins 1913-14
W. H. Sharpley 1915
Robert Speer 1916-18
W. F. R. Mills 1918
Dewey C. Bailey 1919-22
Ben F. Stapleton 1923-30
George D. Begole 1931-35
Ben F. Stapleton 1935-47

a road around Berkeley Lake for horse racing. It went through a busy playground. We eliminated it and the road through the south part of the park. And in Cheesman Park we closed Franklin Street. As a continuation of Park Avenue it was becoming a main artery.

Mountain Park Developments

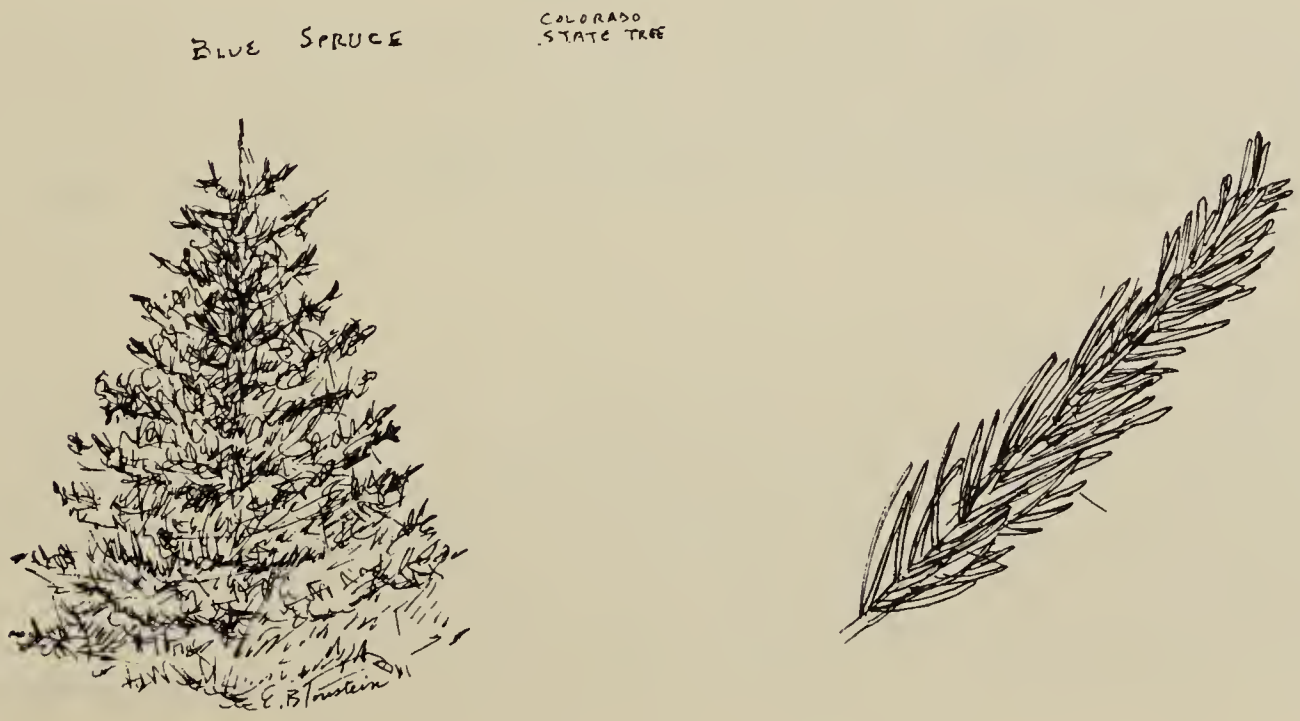
I have told you of the roads built in Denver's Mountain Parks under Speer. The developments in the mountains continued after he was gone. In Stapleton's time the road was built from Bergen Park to Echo Lake by the city. The city's road from Echo Lake to Mount Evans came later, and the road from Echo Lake down to Idaho Springs was part of the state construction. Echo Lake Lodge was built as a final point of the mountain park system. Denver had built Tahosa Lodge on Genessee Mountain which was never too successful. The whole development on top of Lookout Mountain, including the lodge, was built by the city.

Cherry Trees and Crabapples

Stapleton had been to Washington at the time the flowering Japanese cherries were in bloom. He came back and insisted on cherry trees in Denver. So we bought a number of cherry trees. They all froze that winter. We bought some more and some more. No luck. Our climate was too severe for them.

In a corner of one of our parks we had a scraggly old flowering apple, a purple Japanese crabapple. Why not try that? The crabs we bought survived and in a couple of years produced beautiful pinkish-red flowers. We planted half a mile of them along Marion Street Parkway and Cherry Creek and they are still there. As we kept on planting them, new varieties were tried. Today we plant several varieties of crabs here with success.

A strange thing happened when the city trees began to blossom. The citizens fell in love with them and began to plant flowering crabs in their gardens. They took over the project. Today, in the spring, the city is in color from one end to the other.



VI

DENVER ZONING AND PLANNING

DURING the first term of Mayor Stapleton, many new ideas in city building were developed. It was the beginning of zoning in Denver, James Burnett was president of City Council in 1925 when Stapleton appointed the city's first zoning commission. New York and Los Angeles had begun zoning plans; Denver was the third city to try it. Nice neighborhoods were being ruined by shabby looking business houses and there was a sad need for zoning regulations. The city employed Robert Whitten, a New York specialist, to start the work.

I was a member of the zoning commission and I was employed by the city to work with the specialist on the zoning plans. Another commissioner, Irvin McCrary, also worked on the zoning. Mac never did much. I was full of pep. The staff consisted of Mac and me, a lady secretary, and a draftsman. For a long time we didn't have an office in City Hall, but eventually we did.

For the zoning plan we made a survey of all existing conditions in the city. It was carefully figured out. Finally it was ready.

The original Denver ordinance was clumsy and overloaded with legal terms. It has been rewritten many times. Later ordinances were less technical, based on the principle that the common man should be able to understand them.

The Park Hill Improvement Association was the main supporter of the first Denver zoning ordinance. Without its enthusiasm and aid the plan might not have been adopted. City Council President James Burnett was largely responsible for its adoption in 1926.

The Denver zoning ordinance stood the test of time largely due to the determination of Fred Ameter who steered it through many political scuffles. If it did not accomplish what some had expected, it did protect large neighborhoods from the creeping blight by which they were threatened.

Planning Commission

In February, 1926, when the zoning ordinance was adopted, City Council appointed a planning commission with John Flowers as president. Flowers was active and interested in Denver. He did a remarkable job in the brand new field of planning; they could not have chosen a better man. He had gone to Washington to get the new post office located on its present site. He owned property within two blocks. If he had expected

some gain in the value of his property, he was disappointed. Values of land near the post office actually went down. Surveys have proved this.

I was a consultant on the city zoning and planning work, together with the landscape firm of McCrary, Culley, and Carhart. We were all young men in the planning field. We were working toward a major plan for the whole city. Several preliminary studies of traffic and parks were made and presented. The final "Denver Plan No. 1" was published on December 27, 1929.

Denver Plan No. 1

The 1929 report contained a brief history of Denver and an analysis of its population growth.

The graph showing past and future population growth was carefully drawn by Louis Douglass who later became dam engineer for the U.S. Bureau of Reclamation, and still later chief of the Hoover Dam project. In making the graph we checked those of the telephone company, Public Service Company, and the Water Board. They all showed the same climb, from 300,000 in 1929 to 600,000 in 1960, and a million in the year 2000. Now, in 1972, the city has already exceeded the million mark, but half of this is in the suburbs.

Since Denver had much vacant land, it had an overall density of 6.73 people per acre, although the density was 37.8 people per acre around the Civic Center and 15.9 per acre in the district near Washington Park. Some areas had less than one person per acre. If we compare this with New York with 29.8 people per acre, Chicago 14.4, Milwaukee 25.8, Kansas City 7.6, and Detroit 20.5, it can be seen that Denver had room for growth inside its 1929 city limits.

The report noted that Denver was essentially a city of one family homes, and said, "This commission is not in sympathy with any attempt to change this characteristic of the city."

Streets in the Plan

A plan for a traffic way around the central business district was part of the first volume of the Denver Plan. That plan has been in many reports and even today is part of the Urban Renewal Project. The line on Larimer Street has varied, with both Market and Larimer Streets being suggested for the route.

Traffic counts and studies began with that report. It was shown that Broadway, Speer, and Colfax were the heaviest traveled arteries.

A general plan for street development showed the first plan for Buchtel Boulevard with its continuation to the Platte River. (Essentially, the line of I-25 today.) Broadway was extended through Globeville. Speer Boulevard was shown extended to Berkeley Park and Arvada. North Denver Park District defeated that idea. Alameda Avenue, University and Colorado Boulevards were to become main thoroughfares.

Parks in the Plan

In the park and recreation section of the plan, Civic Center was to be extended west to Cherry Creek from the new City Hall. This extension was later blocked by the construction of the U.S. Mint addition. The plan visualized a parkway around North Denver as I have told in my story of Barnum Park. There were plans for additions to Rocky Mountain Lake Park and Sloan Lake Park, and to the north side of City Park for a municipal golf course. Marion Street Parkway was supposed to go through Washington Park and then past South High School to University Avenue. The School Board stopped that one when they took all the space around the high school. All of this planning was an elaboration of the original parkway plan by George Kessler.

Mass Transportation Plan

The second and third volumes of the Denver Plan, published in 1931 and 1932, under Isaac Keator as chairman of the Planning Board, made more detailed studies of traffic and mass transportation. The mass transportation plan, if carried out, would have solved many of today's problems. Bus lines were planned to operate within ¼ mile of all residences, feeding into electric lines on Broadway and Colfax. It would have been easy to carry out the plan before the Tramway Company removed the rails, or covered them over, on those main streets. The report was written with the assistance of the manager of the Tramway Company but it was never applied. Today the system could still be effective if the main lines were placed on railroad rights of way.

Regional Plan

The Regional Plan for Denver was perhaps the most important work of the Planning Commission. Under the presidency of C. M. Lightburn,



Celebration Parade – Opening of Buchtel Blvd. – 1936

the commission published a preliminary outline in 1933. This was followed by a more detailed study in 1936 under the chairmanship of George R. Day. The two reports contain a careful analysis of the region around Denver and proposals for its development.

One proposed project, eventually carried out successfully, was the Boulder Turnpike. It was first planned to run beside the Colorado & Southern Railway tracks from Denver to Boulder. The Boulder Planning Board proposed a more direct route. Under the personal direction of Roderick Downing, professor of engineering at Colorado University, students made the first real survey, shortening the alignment still more. The State Highway Department didn't accept the proposal and it met with much criticism in the legislature, which voted against it. But when it was proposed that the cost of the road be paid for by a toll from the motorists, it was approved and built. The highway was a great success and today it is one of the most important ones in the state in spite of the fact it was never made part of the U.S. Public Roads system.

The plan called for a major highway through the city, from North Broadway south along the Platte River, then southeasterly on Buchtel Boulevard. The city did much work on this and Carl Feiss, director of the planning work, had a model made of it and set up in City Hall – a great help in "selling" the project. That was the plan that became the Valley Highway, Interstate 25.

Other Main Highways

We had suggested a main traffic highway between the Greeley road and the Fort Collins road, running north from Denver to carry the fast traffic through to Wyoming. The mayor of Johnstown realized that the new highway would come close to his town. He came to City Hall in Denver and showed the report and highway plan to Charles Vail, who at that time was Manager of Public Works. This led to the construction of the North Washington road, which Mr. Vail promoted when he became chief engineer of the Highway Department. In later years, Interstate 25 was actually built on the old Broadway line, extended to Cheyenne.

Another proposal in the plan was for a circular boulevard around Aurora, along Sand Creek, and across on 46th Avenue to connect with the Boulder cut-off. When Interstate Highway 70 was finally built it was placed along 48th Avenue.

The Regional Plan we have been talking about proposed a road from Mt. Vernon Canyon running by small communities on the east slope of Green Mountain to Englewood and Littleton and along Hampden Avenue and Peoria Street to what is now I-70. Sections of this plan have become roads but none of them have the aspect of a great scenic boulevard, which they could have been.

At the time the regional study was made, Denver was a relatively small city with no indication of the post war growth as has happened. It is remarkable that the plan still fits the larger city which has grown up here.

VII
THE DEPRESSION IN DENVER

IN late 1929 the whole economy of America collapsed, following the stock market crash. None of us escaped the financial depression. It showed us that, God! you can go hungry right in the middle of a pile of gold.

I had a good sized staff in Denver before the crash, and the people all had to be laid off. I had a second office in Houston, where my staff was mostly making plans for real estate developments. For a few years, that office had been a wonderful thing, but when everything went broke, I went broke everywhere. Two of the men I laid off in Denver went to Houston to take over that office, believing they could make it go. They went broke too.

No Plans

I found that the thing that made the depression so bad was the fact that, even though there was government money to put the unemployed to work, the cities had no plans for the work to be done. Denver was the outstanding example of that.

Denver had 400 CCC men, under Major Ardourel, sitting on Genessee Mountain with nothing to do. The head of the National Parks camps asked me if there was any solution to this problem. It seemed that the Denver city administration was violently opposed to the efforts of Washington to create jobs.

At the time I was planning consultant for Boulder, Colorado, as well as Denver. Harold McClintock, Boulder's city manager, and I worked out a program of needed improvements on Flagstaff Mountain, and in a few days Major Ardourel brought his men to Boulder. They marched by the courthouse, presenting their shovels in a salute, on their way to the mountain. As a result, Boulder got the mistletoe cleaned out of the pines, a road up and over Flagstaff, a picnic building, an overlook outdoor theater on top of the mountain, and other improvements.

After a flood in Cherry Creek, I took the men from two CCC camps and put them to work cleaning up brush and stuff and restoring the channel. We had quite a lot of it done when an official came out of Washington and decided we were doing flood control, not park planning. He took the men away.

Regional Mapping

The depression began to pinch in 1931. Denver voted over half a

million dollars for unemployment relief but City Hall had no plans to use this money advantageously. All they could think of was to pay men to shovel off sand that had washed over the new sidewalks in Bonnie Brae. Important work for the unemployed was blocked by the unions. It was at this time that the Planning Board took up its project of regional mapping.



The regional mapping project of 1932 had two principal purposes: to put our unemployed engineers to work and to provide much needed up-to-date maps of the region. It was led, or rather, pushed, by C. M. Lightburn, secretary and past-president of the Colorado Society of Engineers, and president of the Planning Board. The Planning Board laid out the job, U. S. Geological Survey cooperated, and the federal government paid the wages. The Colorado Society of Engineers, listing some 250 job applicants, furnished the men. Actual field work corrected the old maps and furnished the date for new ones.

A foothill road was proposed and engineered in the depression period. It would have created a scenic road, carefully planned to connect attractive areas between Boulder and Colorado Springs. Beginning on the east slope of Flagstaff Mountain at Boulder, it was to skirt Eldorado Springs, the mountains west of Arvada and Golden, go past Red Rocks Park, and run southwest from Kassler to the mountain area west of Sedalia and Monument, coming into Colorado Springs at the Garden of the Gods. No construction was ever started. I still believe that the Denver-Colorado Springs tourist area ought to build this road for slow traffic and scenery.

WPA Work

WPA work was sneered at by many, but in fact Denver got a great deal out of it. When Ben Stapleton came back into the mayor's office in 1935, he had all kinds of plans ready to be carried out. George Cranmer was appointed Manager of Parks and Improvements and he took on the construction work. Cranmer got things going.

Stapleton and Cranmer used WPA labor to build the Red Rocks theater and the roads and parking lots for it. Then the WPA people built Alameda Avenue Parkway from Denver to the Red Rocks. Denver bought a very wide right-of-way for this road and side strips were planted parkway

style. But the county neglected the planting and allowed trees to be removed wherever a business wanted access and a view. Today there is little left of the parkway plan.

Other important WPA projects included riprapping the banks of the Platte River and building roads along it, widening roads at Inspiration Point, and some development of roads along Cherry Creek above Colorado Boulevard.

As the depression got worse, industries shut down and unemployment increased. My private work closed up and I went to work for the National Resources Planning Board as a consultant.

VIII

PLANNING FOR THE WEST

MY study of Grand Junction, some way or other, got to Washington and, eventually to Frederick Delano, the uncle of Franklin Roosevelt. Mr. Delano was responsible for my appointment as consultant to the State Planning Board of Utah, under the National Resources Planning Board.

Mr. Delano was, in my opinion, the genius who really got city planning under way in this country. He had been chairman of the Chicago Planning Board and had made that city famous for its planning work. When the National Resources Planning Board was established by President Roosevelt, Delano was made head of it.

Utah

Jacob Crane of Chicago introduced me to the Utah Planning Board and left me without any hint of what I was to do. I want to tell you I was absolutely at sea! I felt like a mouse in a cathedral. What was I going to do?

I collected all the information on Utah I could find and sent it to Washington. It came right back with the comment: "We don't want the reports of somebody else, we want you to analyze it all and make a state plan." So, that's what they wanted!

There were no text books nor manuals on state planning, but I had the Hoover Reports, made under Secretary of Commerce Herbert Hoover. From these I obtained the basic information needed to begin my planning work in Utah.

We organized a large staff, some 50 or more unemployed architects, engineers, mining specialists, but the best men did not stay long; they found work in private business after a while.

A systematic study of all the resources of the state was undertaken. It included land, water, railroads, cities, industries, commerce, health, smoke pollution, etc.

Much work had already been done by the state department of agriculture on a study of land, especially its ownership. As you know, a high percentage of Utah's land belongs to the federal government. The land, of course, is the base on which all other elements depend.

Water is the next most important resource of the state. An overall survey of water resources for irrigation was done by a special committee. The survey indicated that when a few proposed projects were completed the State of Utah would have used up all its water available for irrigation.

But one of our WPA engineers by the name of Borg came up with a daring proposal. The Flaming Gorge Dam on the Green River had been under consideration for a long time. It was designed as a power project. Borg suggested that the water used for power should also be used for irrigation. He proposed a tunnel through the Uintah Mountains, carrying Flaming Gorge water to the south end of the Salt Lake valley to irrigate more than a hundred thousand acres of fertile land.

I mentioned Borg's proposal to Lee Kimball, the engineer in charge of the Salt Lake Irrigation District. Like others, including the governor, he declared it to be a pipe dream – impossible from an elevation standpoint, and too expensive. Since Kimball was an expert on these things, his opinion was final as far as I was concerned. Two weeks later he telephoned me in Denver. "I take it all back," he said. "It *is* possible, and does not need to be costly." Lee's acceptance of the Borg dream caused a great awakening in Utah. Everyone began to see the possibility of a great agricultural development for the state. The Salt Lake Tribune devoted a Sunday issue to the story.

Frederick Adrian Delano was born of American parentage in Hong Kong, China on September 10, 1863. He began his career as an engineering assistant for the Chicago, Burlington and Quincy Railroad in Colorado in 1885. By 1901 he was general manager of that railroad, and later he was president of several railroads. Woodrow Wilson appointed him a member of the Federal Reserve Board in 1914. During World War I, and for a few years after, Delano served as a colonel of the U.S. Army Corps of Engineers in France. In 1925 he was chairman of a League of Nations Committee.

Frederick Delano was a pioneer in city planning, being a member of the citizens group which sponsored the "Wacker Plan" for Chicago. In 1927 he was chairman of the Commission on Regional Planning for New York and Environs. Franklin Delano Roosevelt, his nephew, named him chairman of the National Resources Planning Board in 1934. He was president of the American Civic Association 1925-37, and of its successor, the American Planning and Civic Association. The list of Mr. Delano's activities in national, state and local public service agencies is unbelievably long, as is the list of his memberships and official positions in prominent societies and organizations.

Before anything could be done, Lee Kimball was killed in an automobile accident and his bold project died with him. The Flaming Gorge Dam was built without the irrigation project.



Brigham Young as Planner

If you study the early history of Utah you will learn that Brigham Young was not only head of the Mormon Church but was also governor of the territory, and a great planner. Before the original Mormon settlers reached the Salt Lake Basin, Young was planning their future city.

He laid out a rectangular street pattern with blocks ten acres in area and streets eight rods, or 132 feet, in width. When the blocks had been staked out and the survey tied to the meridian of the area, all the leading families among the settlers received building lots of their choice. Young kept a large tract for himself and a very large area for the church.

Young sent out scouts in all directions to locate grazing and crop lands, water supplies and minerals. Then he made plans for their development.

Although it hadn't been realized at first, the church required that all property was to be owned in common. In southern Utah this system succeeded and the people lived in community dormitories and ate in community eating halls. But in the cities it didn't always work. The people who had built homes on the lots claimed private ownership and after a while the federal government supported them. Utah had to abandon the community ownership idea and fit the American way.

In spite of the many difficulties he faced, Brigham Young was certainly one of this nation's foremost planners and builders. He developed a modern civilization on the most unpromising desert land.

Copper, Iron and a Smelter

Copper mining became an important industry in Utah. With the Nation's supply diminishing. Bingham Canyon and Tooele copper mines gained in importance. The start of the great depression caught the copper industry in great difficulty. Price of copper on the world market fell below the cost of production. Utah Copper Company had to lay off some 4500 men. For a year the company kept many of them on the payroll but after that they were on public relief. It was no easy

matter for the state and counties to provide work for so many. Advanced planning became an important matter.

Some iron had been mined in the southwest corner of the state and had been processed in a small smelter near Provo, but it was believed that the quantity available was limited. The Utah Planning Board made a world-wide study of iron which became the board's most valuable undertaking.

The report on iron did not emphasize the international situation. It brought out the fact that southwestern Utah had enough iron for development. A study by the U.S. Geological Survey confirmed this and pointed to large supplies. A smelter could be located at Provo where all the other essentials for iron processing were within easy reach.

In 1940 the second world war seemed imminent and the need for iron in munitions became very great. Frederick Delano came to Salt Lake and together with the governor, Henry Blood, and other officials, we inspected the site of the proposed smelter near Provo. The Geneva Smelter was built, in record time, and was operated by the government. After the war it was sold to a private company and is still operating today.

It was fun to travel with "Uncle Fred" Delano. Wherever we went, men, mostly park superintendents, were ready with their cars, and, of course, their problems. We visited Bryce and Zion National Parks, and went through the beautiful Arizona forest to the north rim of the Grand Canyon. The evening we were there we sat on the open rocks around the hotel watching an eclipse of the moon and listening to two girls singing softly. The next morning we were guided by the girls to a small plane which took us to the south rim. If you ever want a thrill, fly across the Grand Canyon in a small plane. There is a strong down-draft and you hang on for dear life.

New Mexico

After we were well on our way in Utah the National Resources Planning Board added the New Mexico planning work to my program. New Mexico's board consisted of university and college presidents and a couple of business men. Their attitude was quite different from that of the Utah Board. The Salt Lake attitude had been one of serious thinking. The Santa Fe attitude, although serious, was more light hearted. I liked the New Mexico attitude and if I ever leave my dear Colorado, I have a building site picked on the Rio Grande River south of Santa Fe, below the bluff.

Dust Bowl

At the beginning of the depression the mountain states were in a period of serious drouth. Nowhere was it more severe than in the southeast corner of Colorado and the northeast corner of New Mexico. Pastures dried up and cattle were sent to Old Mexico to survive. Plow land blew away. The story went that a farmer who was following a black cloud

of dust with his power plow explained, "That is my farm. I will plow it as soon as it comes down." The meetings of the New Mexico Planning Board were largely concerned with the dust problem.

The director of the state planning board, Captain Kean Griffith, and I decided to visit the worst dust areas and see for ourselves. Taking Captain Griffith's car, we drove toward Clayton. By four in the afternoon it was dark and we had to turn on the headlights to see the road or, rather, the sand blowing across it. We were stuck several times and finally came to a complete halt in a big sand dune. By letting most of the air out of the tires we managed to turn around.

We had seen a light in a farm house a short distance back and we headed for it; eventually driving into the yard. The farmer's wife opened the door. "Evidently," she said, "you are stuck in the sand. Come in."

They were eating supper and she invited us to join them. We had hoped to get to Clayton, but she said, "You'll never get there." So we joined them. There was no meat, just bread and corn. We had come to see the dust bowl and we were seeing it.

I asked the farmer, "Why don't you move away?" "That's what I say," his wife broke in. "I worry over the children; they get red circles around their eyes from the dust." "I know," the farmer said, "but my father left me this place with 1400 acres of land. If I leave, the place is lost. He homesteaded it, and I just cannot leave." These people had been fairly well-to-do, but now their animals – cows, horses, pigs – were gone, together with most of their equipment.

The wife had been a school teacher and this life was hard on her. But that evening we gathered in the living room and she played the old piano and sang for us. Her voice was barely stronger than the wind outside. It was something to stay with a person forever.

The farmer's wife made up a bed for us in the living room. We did not sleep. The wind howled around that little house like a fury. The family slept upstairs and in the middle of the night I heard them get up. She told us, later, that they were afraid the house would blow over and she had dressed the children to be prepared if the house went down. I have seen poverty in some countries, but this was poverty plus agony.



Toward morning the wind went down. The farmer got up early and began breaking up the tough leaves of century plants to make feed for the few animals that were left. His wife refused pay from us – they

were still well-to-do farmers. I left a ten dollar bill under the kitchen towel.

And What Came of It.

When we reported what we had seen to the State Planning Board they voted to request five million dollars in emergency money from the federal government. We managed to get Utah to make a similar request. Ten million ought to do something, but no one knew what. A restriction against plowing the land was definitely needed. The response from Washington was immediate and with it came the announcement that seventy-five million, not ten million, would be available.

One of the top men of the regional Forest Service was appointed to take charge of the emergency work. He was somewhat bewildered by the problem of what to do with so much money. A large tract of land was bought by the government for experimental work and the Soil Conservation Service was organized. It became one of the nation's most important conservation agencies.

Some two years later the new planning director and I drove by the farm out in the dust bowl where I had spent the night. It was a clear sunny day such as only New Mexico has. The farmer's wife was in the yard and we stopped. She wore a new dress and looked well. I asked her how things were. "Well," she said, "we got some money." She told me that her husband, as a veteran of the first world war, had received a bonus of $1400. I said, "That helped." "I got two hundred for some clothes," she said. "And the rest?" I asked. She turned to the field. There was a new power plow sitting in the field, nearly covered with sand. "There it is," she said.

That part of the northern New Mexico plains is very fertile and the soil is deep. Sooner or later we may find the type of crops which will grow at this 6,000 foot altitude and perhaps learn how to get water for them.

Architecture and Parks

At that time New Mexico was well on the way toward developing its own style of architecture. The Fred Harvey Co. had built eating houses and hotels at most towns along the Santa Fe Railroad main line, using building designs based on the Indian village, or Pueblo, architecture. The LaFonda in Santa Fe, the Alvarado Hotel and the station in Albuquerque, were refreshing items in the western landscape. The introduction of dining cars on the trains made many of these buildings superfluous but several of them remain today.

The Pueblo style had competition from the Spanish Colonial, preferred by many architects. A new capitol was built in the 30's. The first unit, the supreme court building, was in Pueblo style, but the main buildings are Spanish Colonial, to my regret.

We did considerable park work in New Mexico, for Santa Fe, Albuquerque, Roswell, and other towns. George Carlson, who had been with

me in Denver, was in charge of the actual construction on these projects. The Santa Fe work included a parkway along the Santa Fe River. We had a difficult time getting land for this.

The federal government would pay for the work but the city had to acquire the land. We needed 106 separate small tracts for the parkway. At first we had little luck; talk of economics meant nothing to the people. But when we made the plea that they should give land for the good of their city, we got results. An elderly Mexican woman whispered to me that the archbishop would give a strip of land back of the church. A business man donated a strip behind his store. Now the Anglo group began to come in. At last 103 tracts were promised and work could begin.

George went to work, constructing small dams in the river, restoring bridge abutments, and planting parks along the stream. A small building, designed by Carlos Vierra, was constructed as an office for the state park system.



In Roswell, another assistant, Ray Shipherd, worked out the Bottomless Lake Park. There is a great underground flow of water there under the Pecos River. Buildings were put up, pretty much on floats. It was an interesting project.

The People

The New Mexico planning work dealt with people much more than planning in other states had done. Detailed studies on the Pueblo Indian villages were made by specialists. The simple life of the Indians was a great tourist attraction, but these people were miserably poor and did not benefit from the tourist industry.

The villages were picturesque and the Indians were friendly. However, there were limits to their friendliness. A companion of mine, one Sunday afternoon, started sketching some doorways without offering to pay for the privilege and had to surrender his sketches to a husky Indian swinging a harness hame.

Their stolidness was dismaying. When I arrived at an Indian village late, due to mud on the road, on an occasion when I was to show colored slides, I tried to explain, but there was no response, nor did they seem interested in the pictures. Later, the agent told me that he had heard much favorable comment on the pictures.

My work in New Mexico brought me again to the little town where I had first landed in America. The town was named for Lucien Maxwell, a rancher, who had, through marriage and purchase, obtained ownership of a large part of northern New Mexico at one time. When the area became part of the Union, Americans came there to settle. One group tried to grow sugar beets in the neighborhood but failed because there was not enough irrigation water for their crops. Later a Dutch syndicate purchased much of the Maxwell Land Grant and a number of Dutch families came there in search of a cure for lung trouble. They built their own church, but the settlement did not last, and the Dutch scattered to Colorado and Montana.

Wyoming

In spite of the fact that the two states of Utah and New Mexico, to which I had been assigned as consultant planner by the National Resources Planning Board, were enough of a task, I had to accept Wyoming as a third one. The three states, and the Denver region, where I was still engaged as planner, covered a huge part of the United States.

We had previously done much work in Wyoming cities and the state officials insisted that I be their consultant. Our work had begun with a small subdivision in the City of Rawlins, a grimy and unpleasant division point on the Union Pacific Railroad. At that time Rawlins had one tree, a crooked silver poplar. We made a plan for a small park, which we planted.

George Brimmer was a prominent lawyer in Rawlins. He had made some money in the oil business. George was much interested in our planning and planting work. When we did the little park, he suggested other projects – the courthouse grounds, the cemetery, city hall, parkways on the avenues. Years later I discovered that Brimmer had paid the fees for designing those projects. He arranged free labor from the penitentiary for our public work. The warden was anxious to provide outdoor work for the men who were soon to be discharged. A large tract of land, just outside the walls, was owned by the penitentiary. Brimmer arranged to have us design a park for this tract that could be worked by the prisoners and used by the people of the city. It was built and became a big improvement.

When the Rawlins work was completed we designed the grounds of all the state institutions – at Evanston, Lander, Basin, Sheridan, Saratoga, Thermopolis, and Riverton. The Riverton job was for the penitentiary farm. The inmates put up the buildings and operated the 720-acre farm without any fences, on alkali land they had reclaimed.

Later, Brimmer moved to Cheyenne, and of course, we had to do much planning and planting in that city. The City of Cheyenne had large but undeveloped park areas. One, north of the city, included two lakes, a golf course and picnic area. We worked on all of these. Brimmer got everyone in on the program. We had a Rotary Park, a Lions Park, and a Kiwanis Park. An approach road to the airport buildings was part of

the program. Brimmer paid for much of the nursery stock we used.

The city cemetery got some planting, but the main job on this windswept hill was at the Veteran's Hospital. A colonel of engineers came to see what could be done there and arrived on a terribly windy day. "Human beings cannot live in this place," he decided. "Plant the biggest trees you can find here." When we estimated the cost, his mind was changed. We wound up by using small trees, mostly evergreens. The forest is there now, and it is a perfect shelter.

Fort Warren was another item on the Cheyenne list. Our sponsor opened the way for a big tree planting program there and Captain Ware, who was in charge of the work, was enthusiastic. We planted thousands of trees.

I had mentioned to Mr. Brimmer the vain efforts we were making toward a botanic garden in Denver. Without telling me, he wrote to Senator Warren and in a short time a large tract of government land near Fort Warren was set aside for a new plant experiment station of the U.S. Department of Agriculture, and $100,000 was appropriated for development. The experimental plot was established and became an important horticultural center for the West. At the same time we made plans for an operation post of the Forest Service in the mountains west of Fort Warren. The forest guides who had little to do in winter built their own homes and did the landscaping. The trees are grown up now and the buildings nestle against the tall windbreak, protected from the wind.

The Capitol and Other Jobs

One of the disappointments in our Wyoming work was the failure to complete the development of the capitol grounds. Our proposal was to have a large open meadow in front of the building. There was one block of park east of Capitol Avenue and it was extended another block to the east for a building to house the supreme court. The west side of Capitol Avenue, which in the plan balanced the east side, could not be acquired because it contained two large residences. Even now Wyoming would do well to acquire this property and put in a large green lawn as a setting for its capitol.



In 1932, on George Washington's 200th birthday, a program got under way (pushed along by George Brimmer's enthusiasm) to start, or add to, a park in every city and town in Wyoming, whatever its size.

State Planning

The state planning work, done under N.R.P.B., was mostly around the hospitals in Worland and Evanston. The plant material we used was growing right there – native plants collected along the creek bottoms.

We found that the cattlemen and sheepmen of Wyoming, even when fighting each other, were all opposed to national parks, forests, and beautification projects. Much of the land is owned by the government and the railroads. Land use planners must consider these things.

Wyoming was an easy and friendly place. It's a God-forsaken place they live in, but the people are all right. I'm fond of them.

Wyoming Town by Night

Open lonely spaces
Howling coyotes
Star spotted sky
Waving horizons
Far away a train whistling
Miles and miles of openness
Wind is blowing
Dust is flying
Over hilltop
Lights are shining
Lights of a town
Bright in distant darkness
Hearth fires there are burning
Coziness of home
Kindly lights of love and living
Far in the darkness

S. R. DeB.

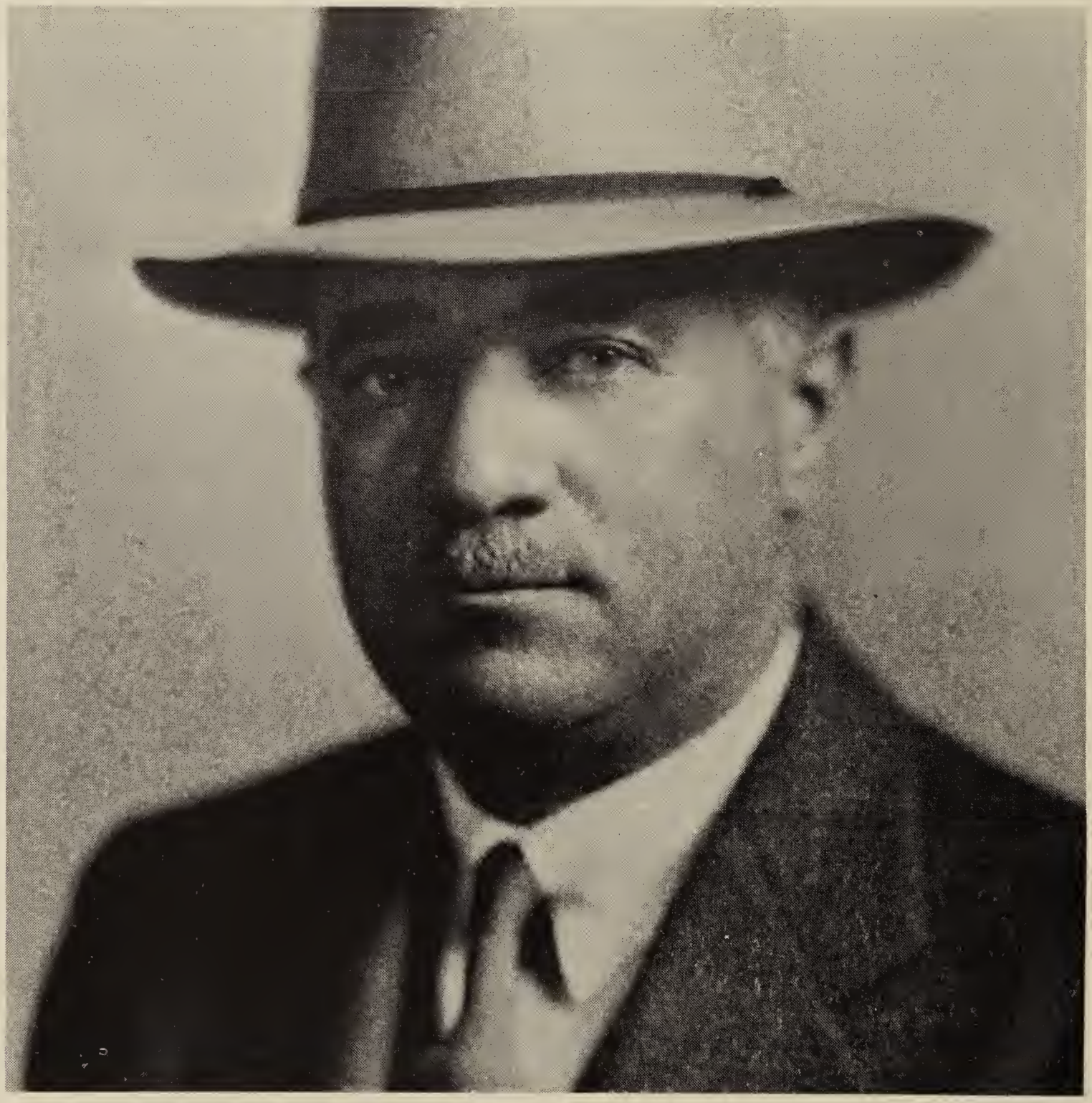
The incomplete index of "The DeBoer Papers" in the Western History Department of the Denver Public Library lists 40 different reports, studies and plans by Mr. DeBoer for the State of Utah. They cover resources – water, land, power, scenery, minerals, etc.; activities – welfare, agriculture, industry, education, commerce, etc.; and such other subjects as population, health conditions, libraries, income, public works. There are planning studies for Ogden, Provo, Salt Lake City.

There are 14 studies and reports on New Mexico covering such subjects as illiteracy, Indian lands and pueblos, irrigation, business, land use. Planning included military posts at Fort Bliss, White Sands Proving Grounds, Holloman Air Base; also planning for Albuquerque, Santa Fe, Roswell.

Wyoming reports in "The DeBoer Papers" total 33, many of them important studies of the resources of large areas such as the basins of the Missouri, Green, Upper Colorado and Yellowstone Rivers. Specific planning reports in this incomplete list are for the state hospital at Evanston, development and parks at Cheyenne, sanatarium at Basin, landscaping Fort D. A. Russell, the campus of University of Wyoming, and others.

The National Resources Planning Board served this country well by bringing the best ideas in modern planning to the states. After many years of efficient work the board came to a sudden death when congress cut off its appropriation in 1943. Many of its studies had been by river drainage areas, and often the pet projects of members of congress for diversions were not what the scientific analysis of the board recommended. The death of the board was a shock to the development of America. It left a legacy of state and city planning boards which continued the work more or less successfully.

National Resources Planning Board: Established in 1933 as the National Planning Board of the Federal Emergency Administration of Public Works, it soon became the National Resources Board and, later, the National Resources Committee. In 1939 it was designated the National Resources Planning Board. Through all its life Frederick Delano was chairman of the Board, with Charles W. Eliot as director. Clifford H. Stone was chairman of the regional organization in Denver. An act of Congress, August 31, 1943, abolished the Board as of January 1, 1944.



S. R. DeBoer

IX

EUROPE REVISITED

FOR many years I had been putting all my strength into leading the planning work in three large states and one major city. In the summer of 1939 I felt that I could not, and should not, go on. My mind was simply worn out. War was visible on the European horizon, and my wife, Anna Beth, and I, saw that if we wanted to go to Europe we had better go quickly. I resigned my position with the National Resources Planning Board, although Mr. Delano felt that they needed me. Then I sent word to Stockholm that I would attend the international city planning meeting in June and I advised my family in Holland that we were coming.

Stockholm

We took our car with us. After landing in Rotterdam, we drove through Germany, Denmark and Sweden, to beautiful Stockholm. The planning meeting, conducted in three languages, was like all meetings of that kind, dull and sleepy. That is, it was dull until a British speaker, referring to a model town on the island of Norderney, built by Hitler and Goring, ran into considerable flak from the German planners.

After the meeting I told Albert Speer, head of all German planning, that I was going to Germany and wanted to see what they were doing. He was very friendly. Since he was going on to Norway, he gave me his card and an introduction to his chief assistant in Berlin. Speer became Hitler's main assistant, all around advisor, and supervised the making of ammunition during the war. Afterward, as a war criminal, he was held in Spandau prison until recently.

Berlin

When we got to Berlin and I presented Mr. Speer's card and note we were royally received. At the planning headquarters we were shown into a large exhibition room in which were displayed drawings of the plans for all the large cities of the Empire. They were well done but all the

Albert Speer: Born March 19, 1905. Professional architect. Became in 1937 "Inspector General of Buildings for the Renovation of the Federal Capital." City planning for Berlin. Hitler's personal, and the Reich's official architect. During the war was Minister of Armaments and War Production. Sentenced to 20 years imprisonment at war crimes trial. In prison until October 1966. As prisoner wrote "Inside the Third Reich" on scraps of paper which were smuggled out of Spandau.

designs were entirely architectural. Later we saw the work being done on Unter den Linden road, the Branderburger Tor (gateway), and the tunneling under the Spree River.

At the tunnel, a group of engineers surrounded us, asking what America would do in case of war. I answered that "we don't want war." Surprisingly, they too said, with much sincerity, that they didn't want war. All of us knew that the war was coming; the atmosphere in Berlin was charged with that knowledge.

On the road out of Berlin we were stopped by men of the Gestapo who inspected everything we had. We had been told to proceed when the inspector remembered that Mrs. DeBoer was driving. He demanded to see her driver's license. As you might expect, she went through everything before she found it. The man could not read it. I explained what was on the card, but I did not mention that the license had run out a month before.

German Cities

We arrived at Munich late at night and the next morning presented our credentials at Hitler's headquarters. Through the people there we were received by Munich officials. They showed us the monument to the men who had died in the Beer Hall Putsch. There was a dinner at the Munich museum and a trip to a famous forest cemetery. We were glad to leave; we felt uneasy in Munich.

At Nuremberg we drove within the walls, right into a mob of excited youngsters gathered for a "Youth Day." It seemed wise not to stay and we left without seeing much of the old town.

A garden and horticulture show was going on in Stuttgart when we got there and we visited it with the local planning director. Stuttgart is in a famous plant-growing section. Its main park was a schloesgarten – a royal or ducal garden – occupied by Hitler's men.

The old buildings in Meinenger, around a small park, were charming. I hope we learn to make city shopping areas as beautiful and pleasant as those.

Switzerland

So we came to Schaffhausen, saw the waterfall, and crossed over the line into Switzerland. Mrs. DeBoer sighed, "We can talk again." It was good to escape the Gestapo atmosphere.

Both Zurich and Lucerne have beautiful lake fronts: large hotels facing parkways lined with trees, next to the lakes. I was itching to study them, but our schedule did not permit it.

We drove to St. Gotthard Pass and had lunch in an attractive restaurant on top where a singer and flutist charmed the customers with Tyrolean songs. The St. Gotthard Pass road is built against the rocky walls of the mountains, not tunneled as are ours, and is very impressive. We spent a few days in Locarno on the Alpine Lakes and then started back to Holland. Our hostess in Lucerne urged us not to go through Germany,

but I insisted because I wanted to see the school of landscape art I attended long ago. I said, "I am an American citizen; they won't dare to touch me." She replied, "You are child-like. The American government would not know of your disappearance for six months."

And Return

We went back to Germany and down the Rhine to what had been the Imperial School of Landscape Art. The school had been moved to Dahlen, near Berlin, and the site was a park. When we stopped for gas in Wiesbaden, the attendant told us, "Better fill up; I have orders to stop selling." The war had begun. So, through Cologne to Cleve and into a patriotic parade. We kept out of the way.

At the Dutch border our persons and our car were rigorously searched. We had nothing to declare. They didn't find the six bottles of Rhine wine on the back seat under a blanket. I didn't declare them because those fellows were so brutish and rude. Our experience with German custom officers was far more pleasant than with those at the Dutch border.

We had been visiting in Holland only a few days when word came from the American ambassador to get out and get back to America.

We left immediately, almost missing our Holland-American ship because of the crowds of German Jews trying to leave. If I had not used my roughest language we might not have got on. A kind old Denver minister put his baggage in a cabin, but when he came back a German woman had put his baggage out in the corridor and had taken possession.

The first night in the channel the ship was kept in darkness so as not to attract gunboats. At Southampton, where the harbor was closed by under-water gates we took on a large number of refugees, then headed west into the ocean. Our ship sailed with half a crew because of a strike in Rotterdam. The gaps were filled by student travelers. Out in the Atlantic we picked up the survivors of a sunken freighter – 33 men rowing around the floating grain that was all that was left of their ship and cargo.

How welcome was the sight of the Statue of Liberty and the Manhattan skyline! We had never appreciated our home in America so much. We had managed to cross the Atlantic by the last passenger ship.



X

MODERN TIMES

THE Colorado Forestry and Horticulture Association was organized in 1944. From the beginning, it dreamed of and worked for a botanical garden in this area. Mrs. John Evans gave the association a building on Bannock street for its headquarters. George Kelly was director, secretary, and editor and we owe much to George's devoted service. The association did some good work in designating horticultural areas in the state, such as the 800 year old junipers in the Garden of the Gods, the silver firs in Cheyenne Canyon, pinon pines nôrth of Fort Collins, and the yucca plants at Palmer Park. The first three of these areas were made official in 1948, and were suggested by George Carlson who was then assistant superintendent of parks in Colorado Springs.

Denver Botanic Gardens

If it had not been for the perseverance of Mrs. Evans, president of the association, Denver would not have a botanic garden today. I remember going to a dinner at Mrs. Evans' big palace on the hill, where Darwin Andrews gave a talk on native plants. Darwin was a Boulder nurseryman and plant collector who contributed much to our knowledge of Colorado plants. Of course, we talked of our plans for a botanic garden. I remember it well because we all came dressed in our best clothes, except Mr. Andrews, who came in his working clothes.

We were always trying to obtain some land for the great garden we wanted but we never had the finances to purchase a big tract of land. Finally the association asked the City of Denver to set aside 100 acres at the east end of City Park as a botanic garden, and the city did this. It seemed like a great opportunity. We would have an exhibit of live animals on one side and a beautiful stuffed animal collection on the other side. The botanical exhibit would complete the setting. I believe the contract for this 100-acre tract is still valid.

The plans for the City Park botanical development included a rose garden in front of the museum. It was planted and supported by members of the rose society. An excellent evergreen garden, on the south side of the museum, was donated by Robert More, Denver attorney, who was growing hundreds of kinds of evergreens on his land at Buffalo. West of the rose garden there was a large collection of fine lilacs donated by Mr. More's partner, Milton Keegan. There was a crabapple tree collection, an iris garden, and a cherry and plum collection.



The land was graded and topsoil brought in for the gardens. The trees, south of the museum, suffered from chlorosis due to shallow ground water. A plan was worked out to drain the soil by pumping the water out of the ground and running it down a naturalistic creek into the lake. It is a lovely place for plants. A young graduate was brought in to be superintendent of this botanic area. Immediately there was a quarrel with the park administration which wanted the area for regular park purposes.

A little later Mrs. James Waring donated a large residence at 9th and York for a Botanic Garden House and the city designated 18 acres of its land adjoining the house for a botanic garden. The Colorado Forestry and Horticulture Association was disbanded with Denver Botanic Gardens taking over part of its functions. Mrs. Evans retired as president. I worked up the first plan for the Denver Botanic Gardens.

Although we now have a botanic garden that is developing rapidly, the city will eventually have to acquire a large tract of land for an arboretum. The great need of Denver is for experimentation with trees.

Federal Boulevard Trees

The story of the trees on Federal Boulevard I wish I could erase from my memory. I am not referring to planting the trees in the Speer years, I am referring to what happened 40 years afterward. The trees were fully grown but they had not been watered for several years. The traffic engineer wanted to widen the street and ordered the trees removed. I was on other work. The park engineer who had neglected the trees had them cut down. It was wholesale slaughter, and I am still ashamed that Denver could have an experience like this. The sad fact is that the street could have been widened without touching the trees. I am writing this with a purpose. Some of the parkways are still in danger.

Ruthless Highway Building

The north part of Berkeley Park has been taken out and a fast freeway, I-70, fenced and inaccessible, put in. The change was protested by the people of North Denver for ten years. Even today it is possible to see how another route could have been chosen north of the park at less cost and no loss of park use to the people of Denver. The addition of a

small triangle of land at 46th and Sheridan, long filled with old street car tracks and weeds, has, in a small way, compensated for the acres lost.

DeBoer Projects – Modern Times

As can be seen, Mr. DeBoer's account of his planning activities stops at World War II. He was active for a quarter of a century after that, making plans, studies and reports for many communities throughout the West. Here is a partial list of his work during those years, by no means complete:

Scottsbluff, Nebraska – City Plan	1940's
Boulder, Colorado – City Plan (8 vols.)	1942
Aurora, Colorado – Building Code	1943
Delta, Colorado – Plan for Municipal Cemetery	1943
Colorado Springs, Colo. – Wahsatch Ave. Plan	1944
Golden, Colo. – Preliminary City Plan	1944
Brainerd, Minn. – City Plan	1946
Boulder, Colo., School Dist., #3 – Plans for school plant and grounds	1946
Grand Island, Nebr. – Park & Recreation Plan	1946
Idaho Falls, Idaho – City Plan	1947
Trinidad, Colo. – City Plan	1947
Colorado Springs, Colo. – Plans for Memorial Park, Prospect Lake Recreation Area	1948
Denver, Colo. – Master Plan for Denver's Parks	1949
Glenwood Springs, Colo. - City Plan	1949
Denver, Colo. – Master Plan for Mountain Parks	1949
Colorado Springs, Colo. – Cascade Ave. Plan	n.d.
Craig, Colo. – Plan for City Park	n.d.
Cherry Hills Village, Colo. – Street Plan and Zoning Proposal	1950
Glendive, Montana – City Plan	1952
Denver, Colo. – Master Plan, Denver Botanic Gardens	1952
Aurora, Colo. – Zoning Ordinance	1953
Sidney, Nebr. – Development Plan	1954-55
Douglas County, Colo. – Zoning Plan	1954
Douglas County & Castle Rock, Colo. – Development Plan	1954
Las Cruces, New Mex. – Development Plan	1955
Greenwood Village, Colo. – Development Plan	1956
Moscow, Idaho – City Plan	1956
Bozeman, Mont. – City Plan	1958
Ruidoso, New Mex. – Comprehensive Plan	1961
Carrizozo, New Mex. – Development Plan	1962
Fort Collins, Colo. – Park & Recreation Plan	1962-63
Arvada, Colo. – City Entrance Plan	1964
Kimball, Nebr. – Development Plan	1964

The above list compiled from copies of plans in Mr. DeBoer's library and from incomplete index of "The DeBoer Papers" in Western History Department, Denver Public Library. (Ed. 1972)



From Left: Dan Voorhies, Wellshire; Willard Coleman, Greenhouse; Clyde Hill, Zoo; Wendell Keller, Sunken Gardens; S. R. DeBoer, Landscape Architect; Louis Spallone, Gen. Construction; James Bible, City Parks; Carl Newberry, Golf Supt.,; George A. Carlson, Supt. of Parks; O. P. Hutchinson, Case; Ray Miller (retired) City Park; Charles Hart, Mower shop; John Peketz, Cheesman Park; Russell Ellenbaas, Washington Park; Clyde Lees, Sloan and Cooper Lakes; Edwin Taylor, Overland Park; Martin Schafer, Montclair; Arnold Boal, Berkeley Park; Wm. H. Lucking, Horticulturist; George Noce, Civic Center; Edmund Wallace, Landscape Architect; Earl Sinnamon, City Nursery; Thomas Lynch, East Denver Parkways.

Denver Park Men – 1948

XI

Observations and Opinions

OF the hundreds of activities fostered by city administrations, the overall planning of the city is the most important.

We are challenged to build cities that are pleasant to live and work in. Our successors will judge us by what we do; we will either impress them with worthwhile cities or they will criticize us for lacking the imagination to build them.

Every Town's Plan

The plans for Central Park in New York, over a hundred years ago, stimulated park work. Elaborate buildings and landscaping at the World's Columbian Exposition in Chicago in 1893 inspired the "City Beautiful" period of planning. George Kessler's work on parkways in Kansas City and the work of the Boston landscapers belong to this period. This was the time of the Chicago plan, the New York plan, the Boston plan, every town's plan. It was landscape planning – beautification.

There was no city planning, as we know it now, in the 1920's. Few books had been written on the subject, although there were many park reports and studies. No schools taught city planning. The schools of

landscape architecture and some of the engineering schools taught land and subdivision planning. The present development of many schools of planning with hundreds of youngsters with new ideas is a tremendous superstructure on the early foundation.

After the sudden end of beautifying work during World War I, the cities concentrated on zoning as a way of building attractive cities by regulation. The zoning plans focused public attention on the makeup of our cities and showed the need for overall planning.

From the City Beautiful phase to city planning and then to state planning was a great advance.

As the work of planning entire cities grew in importance a special division in the American Society of Landscape Architects was set up. It was natural to call the division the American Institute of Planners. The profession soon found recognition in many public councils and step by step universities put in schools of planning.

The first book on overall planning, as far as I know, was by John Nolen. He analyzed the street plan, fitted the water and sewer systems into it. The parks and playgrounds, the schools and public buildings were part of the overall layout. A broad analysis of the city's trade territory and its environment was included.

The depression probably had as much to do with the development of our present city planning as anything, because many cities were jarred out of their sleep. Here they had thousands of people unemployed, not loafers, but real men. The cities could get money but didn't know what to do with it. That's why city planning had to grow.

Frederick Delano was a pioneer in city planning. He was behind the Chicago plan. And he became head of the National Resources Planning Board that really put life into city and regional planning.

Metropolitan Area Planning

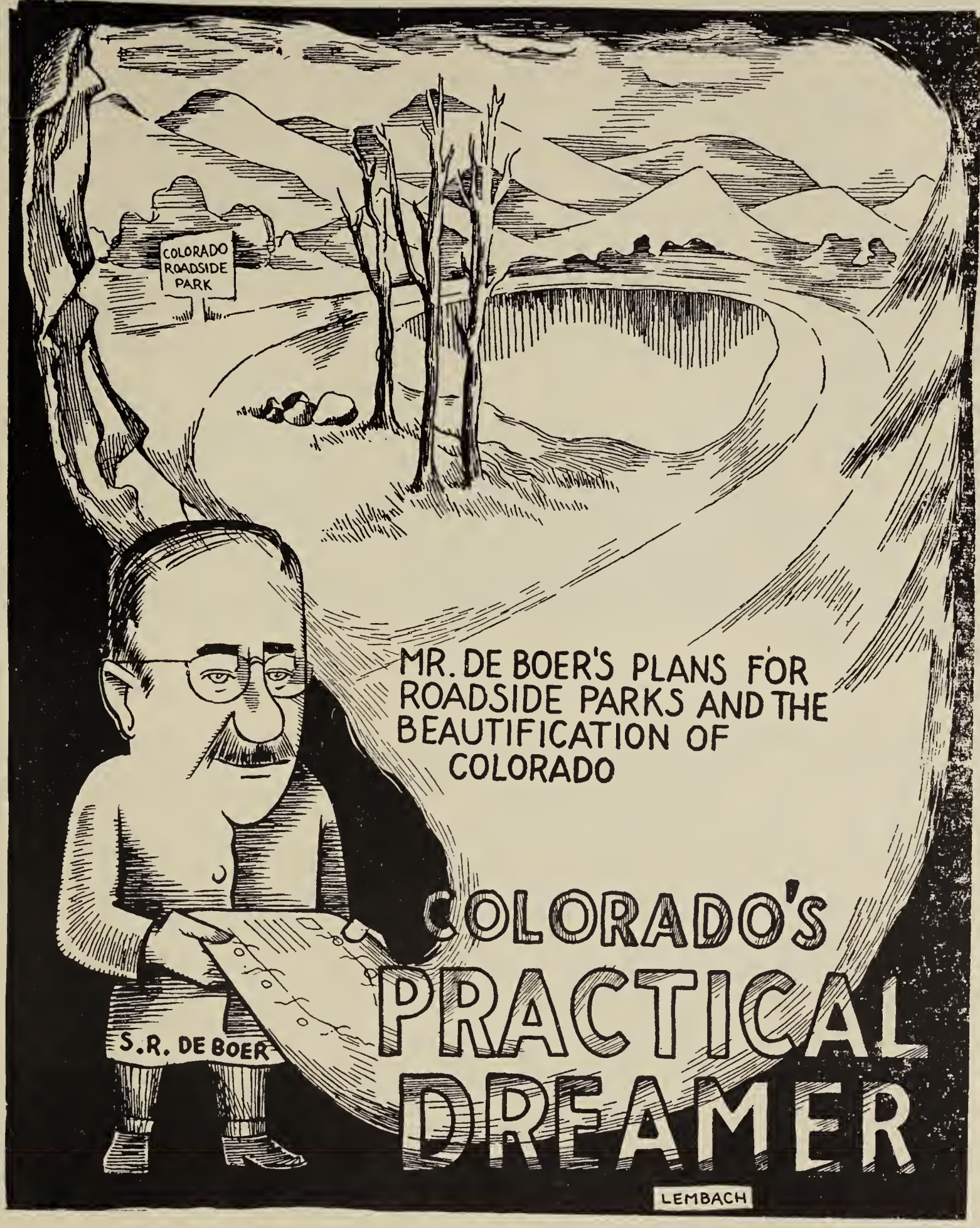
It is essential that a city's planning extend into the neighboring communities. The city and its neighbors should learn that they are both part of a larger city unit in which they all have equal rights. This would make possible metropolitan planning and understanding.

Usually the large central city, in establishing its highways or water and sewer lines, goes through a small suburb in a ruthless way. These things are necessary and cannot be properly located without mutual agreement. A proper solution is a metropolitan authority which can fit all the proposals into one large plan.

If a city plan has been properly prepared it must, per se, include the plan of the area around it. This principle of carrying the city plan into the surrounding area was first applied in the plan I developed for Grand Junction in 1926.

Flowers Give People A Friendly Feeling Toward a City

There was a time when planning was based on a desire to create



From The Littleton Independent – Feb. 3, 1952

attractive cities. Our civic centers, city parks and parkways and other areas of beauty date from that time. The technical computerized formulas often used today lack the human feeling which must be uppermost in planning the places where we are to live.

Planners do not learn about aesthetics any more, and he who mentions the need for an attractive layout with trees and flowers gets laughed at. I do not say that our cities must be beautified at great expense; I say that they may be made attractive and livable. The more people live in

skyscrapers the greater is the need for a little green grass on the ground.

At the many meetings I attend I often hear the complaint: "We cannot afford such open treatment; we must go to the high-rise buildings to accommodate all our people." I doubt this. To my mind the American single family home on its own lot is a precious thing. I see these tremendous buildings with thousands of windows in monotonous rows, and I feel that the men and women living under such conditions are practically prisoners.

And I will risk my city planning reputation by saying that I also believe in flower gardens as being important to our cities. Flowers give people a friendly feeling toward a city. Too many public buildings, in these times, are extremely dreary, without a flower or leaf about them.

I am thinking of the many fine gardens in this country and in Europe which were built by individuals who donated them to their city. There is no better memorial than a flower garden. Many of them are more famous than the cities they are located in. A city's most effective way to promote its status and character may be through beautiful gardens. Once the city takes the lead, the citizens will follow and plant gardens of their own.

Shopping Districts

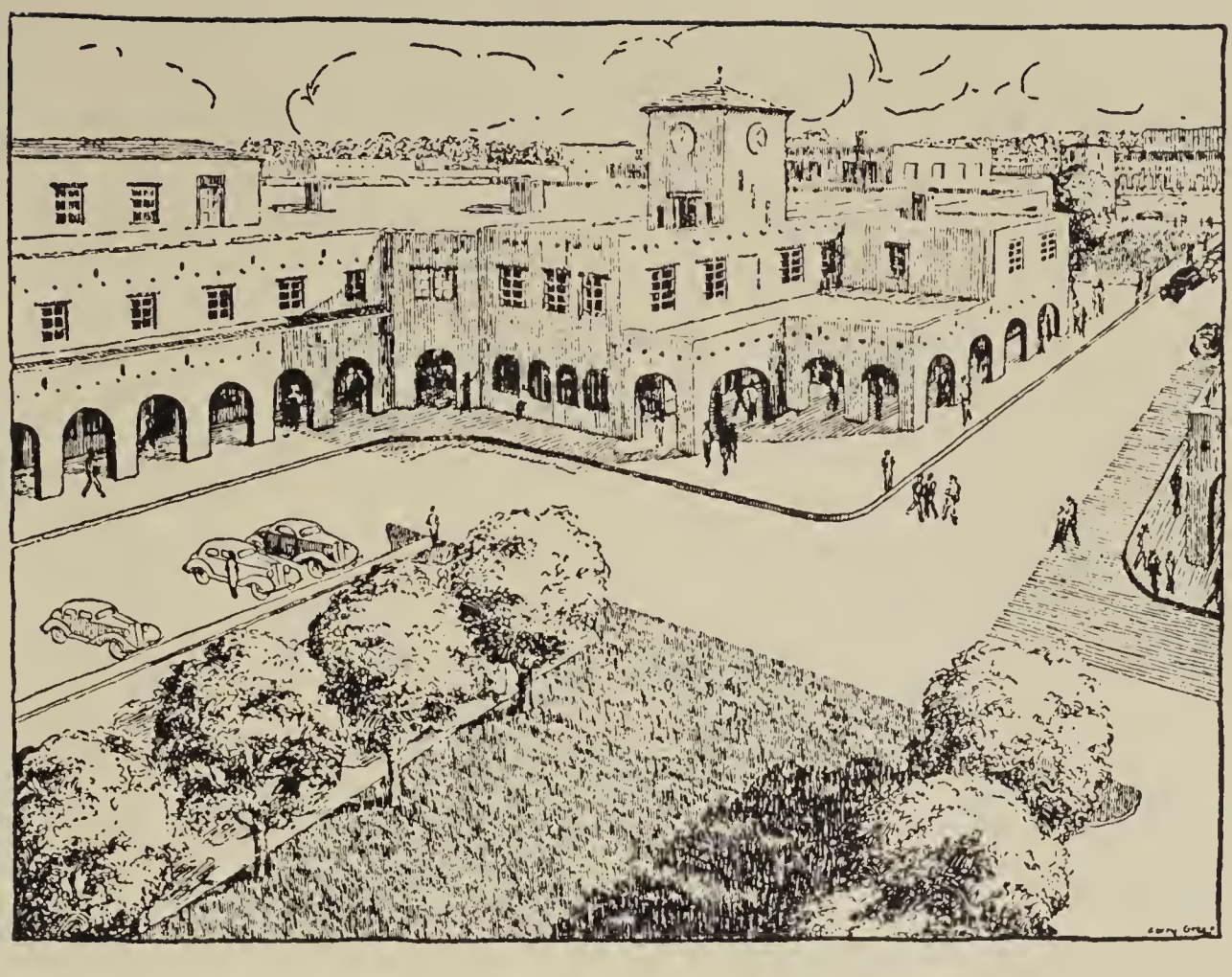
Forty-two years ago, when the American Civic Association published my book called "Shopping Districts", it was one of the first writings of that kind. I wouldn't call it "Shopping Districts" any more. I was talking about the whole downtown area, not about scattered groups of stores.

The name "Shopping Districts" has come to mean the many retail stores districts built away from the city core. Starting as grocery stores they have expanded to every type of retail business. The clothing store, especially the women's clothing store, is the center of attraction. It appears that competing stores have to be shoulder to shoulder.

These stores have a community of interest in the whole district. They are not backward in asking city council for improvements, but hardly ever will they give the customer a bench to sit on or a flower bed to admire. As a rule council will reserve most of the street for traffic to please the traffic engineer who lives by the slogan, "Traffic must move." Usually neither council, its engineers, nor the merchants look at the picture as a whole; they stubbornly run a large number of fast cars through crowds of pedestrian shoppers.

Planning Information Center

I have told you of my model city plan for Boulder City, which was aborted when the business district grew up in the wrong place, leaving a large vacant space in the center of the town. For over 40 years I have been annoyed by that, and I have been wondering what you could do with that vacant area. Recently I was talking with Louis Douglas, the



Proposed Business District Plan of Boulder City, Nevada

Bureau of Reclamation engineer who worked with me at Boulder City, and our conversation about the big blank in the middle of town stirred up an idea in my mind.

It stirred up memories of what I had seen in 1939 in a great exhibition hall in Berlin. It was a grand display of the plans, in drawings and models, of all the cities of Germany, placed there, I understood, at Hitler's order.

What I want to do is this: I want to have the buildings put up in Boulder City's vacant shopping center area, just as they were planned in the first place, but not for the use that was planned. I want to see the new buildings used for an exhibition of city planning. The cities – New York, Chicago, Denver, Kansas City, and others – could each take one of the buildings or spaces and install in it that city's plans. It is my idea to get everything together that is known about city planning in a national City Planning Information Center in Boulder City.

I suggest that the government spend some of its welfare money for this important purpose. It would be a great attraction for planners, builders, city administrators, students and tourists – an educational center in the desert. Too hot there, you say? It is near the lake and there is plenty of power at hand for air conditioning.

Hoover and NRPB Reports

In my work with state planning boards I needed basic information and I frequently referred to *Social Trends*, a work by the Hoover Committee which was written when Hoover was still Secretary of Commerce. The "Hoover Reports" are a compilation of many studies by selected

men and women connected with all our social and economic problems. They were mostly on economics and business, with statistics and basic information necessary for planning of all kinds. They discussed the major industries of the country and made recommendations for their growth and development. The problems of railroads, highways, education – everything – were considered.

The Hoover volumes were one of the greatest contributions to our knowledge of our civilization. They were published in the 1920's and are now, of course, out of date. I have, or had, the final volume, a kind of summary of the others.

Hoover did a tremendous job on this study, and while I didn't think much of his presidency, his work made Roosevelt's work possible. Roosevelt would not have liked that, of course. Roosevelt went into office with a broom and he swept out everything that had to do with government before.

Another great series of publications, a follow up to *Social Trends*, are the volumes published by the National Resources Planning Board, of which Frederick Delano was chairman and Charles Eliot executive director. They were compiled by committees of experts making studies all over the United States, working for several years to gather the material. There were several committees; I was on one which provided information on parks, These were published during the depression years. For anyone studying the basic factors of American resources they are perhaps the greatest source of information.

Milestones for Denver

The first Denver Plan had a chapter on history giving all the interesting happenings of the city's early beginnings. It failed to mention the serious depression of 1893. As I see it, 1893 was a milestone in the life of Denver. The town had been the supply depot for extensive mining activities. In 1893 the mining stopped, mining towns became ghost towns, and Denver was in serious trouble. The cause, it seems now, was a human one: the decision by Congress to set a low price on silver. It is inconceivable that a law could have the effect of nearly wiping out a center of civilization.

The 1893 panic was more than a milestone, it changed the character and future of Colorado. Colorado sought other resources and found them in its sunny, healthy climate. By 1900 Denver was known world wide as a health resort. Great sanatoria for tuberculosis patients were built and continue yet, as general hospitals.

The next milestone was the work of Robert Speer. When the Civic Center and the major parks were open and blooming, Denver began to attract people for its beauty. It became a tourist city, overshadowing other centers. It is well for us to remember 1893 and Robert Speer as the factors that made Denver. Can we maintain our enviable status with a smoke cloud hanging over us, causing lung trouble instead of curing it?



Mrs. Verner Z. Reed Estate

Denver Mountain Parks

The Mountain Parks have been a great asset to Denver, and I think it would be silly for Denver to dispose of them. No city could ever acquire so fine a scenic area as that at any price.

It has been suggested that the state take over Denver's Mountain Parks. It is a ridiculous idea. I am not opposed to the state owning and operating parks, but if it has the financial ability to do so, it should acquire other land, and not take on what Denver has already established. The state is doing a good job in developing Golden Gate Park, above Golden.



The Home of the plans

The cost of maintaining the Mountain Parks is small. Some areas, like the Red Rocks Theater, are definitely not suitable for state management. The city should keep the parks and enlarge them whenever it can.

The possibility of fire is a serious threat to these parks. Although Denver's lands are at the lower elevations, the forests that grow on them are part of a wooded area that reaches clear up to timberline. I think that the U. S. Forest Service should extend its fire protections service over all this forested land.

Long ago, when the new Bear Creek road was built, I argued that the road was placed so high and the speeds planned on it were so great that the creek was no longer visible. Maybe we have overdone this building of speedways; people now fly through the mountains without seeing them.

Platte River Parkway

We have, of course, major high-speed highways from Nebraska to Denver along or near the Platte River. I propose a scenic parkway, wind-

ing, slow-speed, along that river, coming in to Colorado near Julesburg, going through Sterling and Fort Morgan and on down to Denver, and continuing through Littleton and up the Platte Canyon to the high mountains. The State of Colorado is already developing state parks near those northeastern towns, and those parks could be connected by this parkway. Trees should be planted along it and scenic areas developed.

I suggest that the road could be divided into sections and the construction done locally by communities along the route.

Eventually, such a parkway could be extended southwesterly from the Platte River headwaters on over the mountains and down to Santa Fe. Colorado needs scenic highways, not racetracks.

Future Denver Park System

Many proposals for future extension of the Denver park system are awaiting the vision and enthusiasm of officials, but some progress is being made. The Cherry Creek dam and lake are there; an outstanding example of cooperation between federal, state and local agencies. Chatfield dam and its lake fit into the Platte River development plan. There are many more park possibilities which can be linked into an outer park system surrounding the city and connected by a parkway. These include Kendrick Lakes, the parks of Westminister and Arvada, the Clear Creek valley and its great possibilities, Bear Creek and its future lake at Mount Carbon, and Sand Creek, east of Denver, not yet developed.

The old plan of a parkway along Cherry Creek being extended northwesterly past Berkeley Park and through Arvada, should be revived to create a diagonal park system from Cherry Creek dam to Coal Creek Canyon. We already have plans for a scenic Platte River strip and parkway through the heart of the city.

I have recently presented new plans for parks and recreational development along the Platte River in the metropolitan area. This development would also serve the purpose of flood control. Parks do that, you know. In 1915 George Carlson and I made a survey of the Platte which showed 48 natural parks, heavily wooded with large cottonwoods, between the Hampden Avenue bridge and Riverside Cemetery. The trees had retarded the high water of 1913 and sent it meandering through the natural parks. By the time of the devastating 1965 flood, the whole valley had been denuded and the river was like an open sewer. There was nothing to slow it down. My recent Platte Valley plans for South Suburban Metropolitan Recreation and Park District would bring back some charm and beauty to the valley and would also create retarding basins for control of the river.

Rocky Mountain Horticulture

Denver is quite different from the other places where people garden. We are more than 5,000 feet above the sea, above the clouds of the low countries. Our air is thin and clear. The rainfall is low; about 15 or 16 inches per year. And this has a great effect on our soil. The soil is

shallow, resting on a layer of alkali, of salts. Lower cities do not have that kind of soil because the rainfall washes the alkali away, leaches the salts from the earth.

Our summers are hot; the sun's heat is not filtered through a dense atmosphere. Winters are alternately cold and warm, and winters are our driest seasons. These conditions are responsible for our lack of native trees. Colorado has not yet awakened to the fact that its difficult climate is, in a way, an asset. A tree grown in Colorado, under the conditions I have described, has a stronger root system that one grown at lower, more humid locations. Growers could cash in on that fact, with the right kind of promotion.

Before It Is Too Late

When I came to Denver we had a mayor who was interested in trees. Today, City Hall shows no interest in trees. Our streets, now, are for automobiles, sewers and water pipes, not for beauty. Cutting down trees half-a-century old seems to be a joy to councilmen and engineers; planting young trees is an act of treason against the city budget. And yet tree planting is ridiculously cheap. Part of this attitude comes from the negative approach to city planning. City planners, now, have no knowledge of horticulture and they avoid the subject. Cities are designed according to mathematical formulas which make them bleak and colorless.

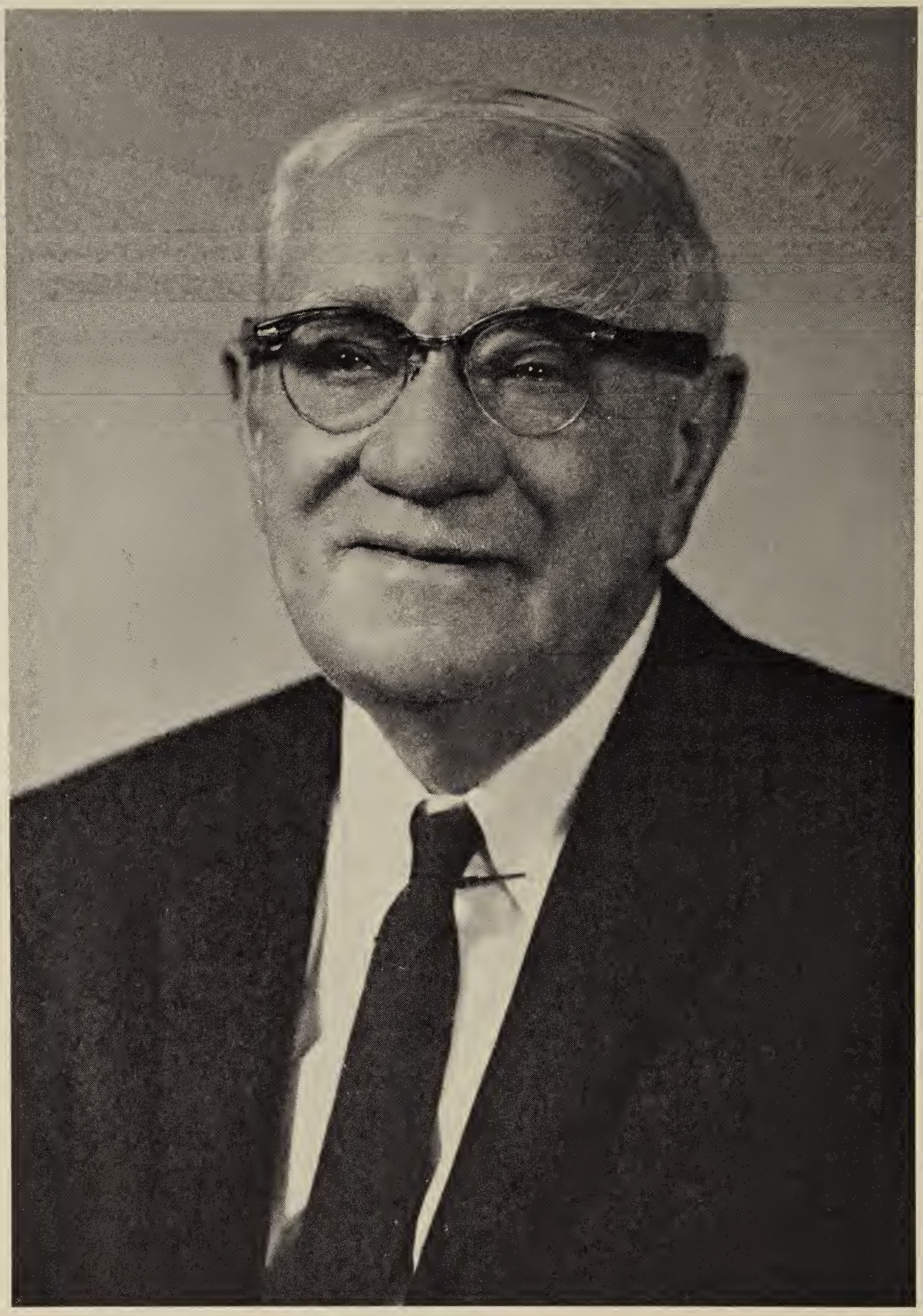
We must not stop in our planning for beauty. Our trees and parks and gardens must be renewed constantly if we are to leave a decent world for those who follow us. Now is the time to plan that world. **The city grows so fast that it will soon be too late if the opportunities for making it beautiful are not grasped now.**

Conclusion

My boyhood dreams of designing bridges to span the canyons of the Alps never materialized, but, if my scribbles, my words, and my hopes have led toward bringing beauty to the treeless cities and plains of Colorado, I will be satisfied.

Articles in *The Green Thumb* by S. R. DeBoer

Title	Volume	Number	Date
The Colorado landscape.	1	1	Feb. 1944
Cottonwoods.	1	5	Sept. 1944
Survey of elm scale completed (co-author)	2	1	Jan. 1945
Adam Kohankie.	2	3	May-June 1945
Landscape architecture frames a picture in a garden.	2	4	July-Aug. 1945
Beauty in simplicity of landscape design.	2	5	Sept.-Oct. 1945
Winter gardens.	3	1	Jan.-Feb. 1946
Oak trees in Denver.	3	5	Sept.-Oct. 1946
Denver parks flower trail.	4	5	Sept.-Oct. 1947
Al Coffin, gardener.	4	6	Nov.-Dec. 1947
A practical plan for a small garden.	9	1	Jan. 1952
Clarence F. Leach, an unusual man.	9	12	Dec. 1952
Master plan for a botanic garden in Denver.	10	2	Feb. 1953
Horse chestnuts.	10	6	June 1953
Keegan's lilac lane.	10	7	July 1953
Over 160 varieties.	10	8	August 1953
Edgar C. MacMechen	10	12	Dec. 1953
New type of street tree.	11	1	Jan. 1954
A Denver rose garden.	11	4	April 1954
Flowering crabapples in the Denver Botanical Garden.	13	1	Jan. 1956
Maidenhair tree.	14	1	Jan.-Feb. 1957
Through the garden gate.	16	1	Jan.-Feb. 1959
A history of the Denver parks.	16	9	Oct. 1959
The Denver civic center.	17	1	Jan.-Feb. 1960
The Barnum Parkway	18	7	Aug.-Sept. 1961
In memoriam M. Walter Pesman	20	1	Jan.-Feb. 1963
Two Oregon grapes.	20	7	Oct. 1963
The Gates memorial garden.	20	8	Nov.-Dec. 1963
Harvard Gulch.	20	7	Oct. 1963
A mountain parkway	22	1	Jan.-Feb. 1965
Flowering crabapples.	22	3	May-June 1965
Chinese elm – still more.	23	2	March-April 1966
The old cemeteries - now Denver Botanic Gardens.	23	5	Sept.-Oct. 1966
The Denver civic center.	24	6	Nov.-Dec. 1967
Cherry Creek parkways.	25	3	Summer 1968
A Chinese oak.	25	4	Autumn 1968
Times change, landscapes change.	26	1	Winter 1969
Strawberries and Colorado horticulture.	27	3	Summer 1970
The rock elm.	28	2	Spring 1971.



S R DeBoer



Civis Princeps

On April 29, 1972, Regis College, Denver, presented its *Civis Princeps* – First Citizen – Award to S. R. DeBoer, for community service. The citation says, in part:

"Many a good and generous man aspires to put a personal mark on his own city. Few have done so as indelibly – though as unobtrusively – as Saco Rienk DeBoer.

"He has always lived and worked in accord with the highest ideals of his profession, considering the doing of a good job more important than the fee it brought. While this has ordained his life to be one of modest means, it has also earned for him the debt and respect of everyone with, or for whom, he has worked.

"His was a 'voice before its time' not only in ecological awareness, but in his concern over the 'modern' tendency to dehumanization.

"He is perhaps more responsible than anyone else for Denver's park and parkway system and the Denver Botanic Gardens."

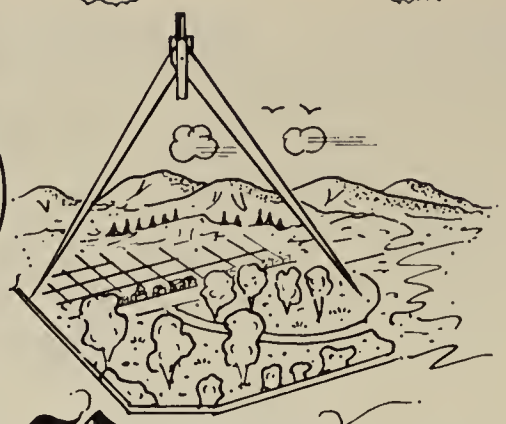
S. R. DEBOER

Memberships and Honors

Fellow: American Society of Landscape Architects
Member: Colorado State Planning Board
Life Member: Colorado Society of Engineers
Member: American Institute of Planners
Honorary Member: American Institute of Architects
Honorary Member: American Society of Planning Officials
Member: Netherlands Institute for City Planning and Housing
Member (Award of Merit): Colorado Forestry and Horticulture Association
Distinguished Service Award (1960): American Institute of City Planning
Outstanding Achievement Award (1961): Colorado Nurserymen's Association
Distinguished Service Award (1966): Americans by Choice
Civis Princeps (Community Service) Award (1972): Regis College
Denver City Council passed ordinance (1962) naming park at Harvard Avenue and So. Vine St., *DeBoer Park*



COLORADO • FORESTRY AND HORTICULTURE



Mr. S. R. DeBoer

Dreamer of great dreams, you came to your new land from an ancient culture, bringing with you a broad vision for the future of your adopted country-side.

Author, nationally recognized Landscape Architect, City and Regional Planner, you pioneered in a field unfamiliar to this western country. The record of your achievements is indeed impressive, as we review the broad extent of your work in the entire Rocky Mountain area.

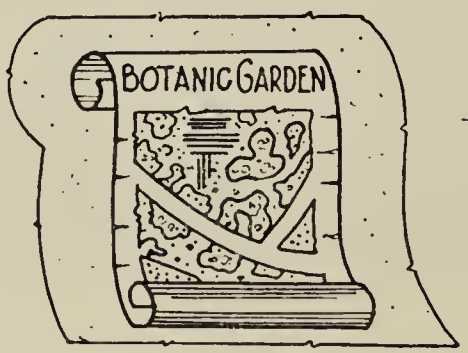
You have lived to see vacant spaces transformed into fine parks and to see the unshaded streets of a small city change, under your skilled hands, to well-planned boulevards, tree-lined and beautiful.

You have complemented and enlarged the use of our magnificent native plant material by the addition of hundreds of new species from far afield, but suited to our unusal climate.

Through years of thwarted effort and discouragement you never once relinquished your ultimate endeavor to establish a Botanic Garden in the Rocky Mountain Region. This - now a reality, - remains one of your greatest achievements.

The members of the Colorado Forestry and Horticulture Association salute you and bestow upon you this Award of Merit in recognition of your services to this community over a period of many years.





Presented to Mr. DeBoer at annual banquet of Colorado Forestry and Horticulture Association, January 18, 1957.

The Idea Precedes the Accomplishment

ANNA R. GARREY

Saco Rienk DeBoer arrived in New York from his native Holland in 1908.

He has told us of his elation at the sights and sounds of the city, of his instant and intuitive sense of having found a haven, a place of such great adventure that his physical frailty was forgotten. Seriously ill with tuberculosis, he had come to the United States as a health seeker.

He recalls his arrival in New Mexico, of stumbling and falling in the snow as he left the train, then rising again. Later, in memory, this seemed a symbol of his restored health and well-being.

Industrious, resolute and stubborn, with what eclectic spirit this man dedicated himself to his new countryside!

Predominately a horticulturist in the European tradition, he also had qualifications as an engineer.

As a horticulturist he saw many challenges here – intense and unveiled sunlight, a semi-arid climate, vast open spaces spreading to a wide horizon or rising to the great barrier of high mountains. What plants or trees might grow here other than the familiar cottonwood or alder at the streamside? Could the beauty of the native flora be brought into city gardens? And more – the challenge of planning a young and growing city – all of this presented itself to him, for he had left New Mexico to come to Denver where he began his work as a city planner.

In Denver's Mayor Robert Speer, he found a protagonist, a practical man of vision and a skillful politician. In the last accounting this mayor's services to Denver may best be measured by the very modest personal estate he left in contrast to his great legacy of a well-planned city.

The practical horticulturist whose interests were soon to embrace a wide field – city and community planning – found his place under the leadership of Robert Speer. To these men of vision the orderly development of a rapidly growing community was of utmost importance. The needs seemed limitless.

Among these, planning and planting became fundamentals and priorities were a necessity. In extensive plantings, what trees and shrubs would survive in this semi-arid land?

In earlier years our pioneers had realized this need and now, from the old world, came a man, Saco DeBoer, who brought new realization of a way to fulfill this need – a botanic garden. The idea had for the first time taken form. With missionary zeal he spread his conviction. As his responsibilities increased and as the scope of his work widened he never lost sight of this goal.

Through numberless talks and through various organizations he continued to stress the necessity for a research center such as a botanic garden.

In tracing the history of the forces which lie behind an accomplishment we find that many seemingly irrelevant elements sometimes unite to bring success. The untiring labors of the many, now long gone, who worked so ceaselessly for a project in a future they could not share – these remain the mute cornerstones of our botanic garden. In this short account of the development of an idea many of these must be for the most part anonymous, though not forgotten, as we often find ourselves speaking of organizations rather than of individuals. A short review

of these groups, however, reveals the continuing presence of the same leaders.

Denver had citizens of vision, early ecologists indeed. Legend suggests that the second forestry association in the United States was the Colorado State Forestry Association formed in 1884 and headed by Col. Edward Ensign of Colorado Springs. These citizens urged the establishment of forest reserves, and, by 1891, President Harrison had signed a proclamation establishing the first reserve in Wyoming, the second in the White River Plateau in Colorado. By 1899 Congress had passed an act providing for the organization and management of public forests.

Wm. E. Byers, editor and owner of the Rocky Mountain News, served as president of the Colorado State Forestry Association for many years. Remembered for his experiments in introducing new trees, he planted some 35 varieties on his home grounds, now Byers Junior High School. Among those listed as members of this association were Messrs. Walter Cheesman and Henry M. Porter. How little did they dream of the part their daughters, Mrs. John Evans and Mrs. James Waring, were to play in realizing their early plans for directed research in plant material – resulting finally in a botanic garden in Denver!

Into this background came this intrepid Dutchman, S. R. DeBoer. As a horticulturist he knew that he was confronted by unfamiliar growing conditions where the traditional and familiar guides of the continent or of England could not be applied. It seemed obvious that in joining such a group as Colorado Forestry Association his efforts would become more effective. As he expresses it, he was "so full of the need for a botanic garden he shared his enthusiasm with whomever would listen."

A faded post card drops from a long unopened volume in 1971. It's date, July, 1918. "The Garden Club of Denver will meet at the home of Mrs. Henry Van Kleeck. Mr. DeBoer will conduct a tour of Denver's Parks."

Rest assured, mention was made of a botanic garden. Or a glance at the list of workers in the groups of those days: S. R. DeBoer, Vice-President; or Botanic Garden Committee, Chairman, S. R. DeBoer; always the familiar names. So the word spread.

Meanwhile the government assumed more and more responsibility for the forests and as early members of the forestry association grew older, interest in horticulture increased so that a new group was formed in 1916, The Denver Society for Ornamental Horticulture. Its first president, Adam Kohanke, superintendent of Washington Park, was succeeded by S. R. DeBoer who also edited its bulletin, *Garden Hints,* for many years.

In the interests of horticulture Mayor Speer suggested that a flower show be held in the new city auditorium. With encouragement and sponsorship of The Garden Club of Denver, which helped in financing these shows, Mr. DeBoer spoke with local florists who stripped their greenhouses to give a creditable display. Many successful shows followed.

On a date worthy of remembrance, May 24, 1941, at a meeting of the Colorado Forestry Association the following motion was presented by Mrs. E. R. Kalmbach:

"Resolved that the Colorado State Forestry Association endorse and aid in the establishment of a Botanic Garden within and adjacent to Denver where various tree, shrub and herb species may be tested. Such a Botanic Garden may not be in one large tract, but many small tracts, located in various zones, extending from the typical Eastern Prairie Zone to Alpine Timberlands. The State Association is not interested primarily in a 'Show Place' within the city limits, but in the practical demonstration of the adaptability of the tree, shrub and herb species to various natural zones. Such demonstration tracts may be located on city, state, or federally owned lands through arrangements made with the proper agencies and such available lands should be assigned to botanical

purposes at any time opportunity is presented."

This may well remain a permanent guide to the future of Denver Botanic Gardens. The herbarium in the Gardens, established by and named for Kathryn Kalmbach, reminds us of her years of dedication to this project.

By 1943, however, it became obvious that the Colorado Forestry Association as well as the Denver Society for Ornamental Horticulture would both benefit by fusing the two into a single new group which would be called The Colorado Forestry and Horticulture Association. This was done in 1944. The first president of this new group, A. Lincoln Fellows, was succeeded by M. Walter Pesman. The labors of this unselfish idealist should not be forgotten.

The organization at this time had no place of being. In lively parlance it might have been termed "a soul in search of a body."

M. Irvin McCrary, landscape architect and city planner, another of Denver's outstanding citizens, offered space in his office at 16th and Broadway where the first numbers of *The Green Thumb* were prepared. Dynamic George Kelly, its editor, was responsible for the name of the Association's publication and served as its acting head. His understanding of the local terrain as well as of its plant material, coupled with his zeal as a conservationist, made him an excellent leader.

Establishment of a botanic garden in Denver remained a top priority as stated in the first issue of *The Green Thumb:* "That this Association take the initiative in promoting a Rocky Mountain Botanic Garden. This project has had the consideration of the Association for so many years that there is no necessity here to stress its importance"

To that first issue Mr. DeBoer contributed "The Colorado Landscape" in which he emphasized the importance of understanding horticulture here: "It does seem, however, that in this Rocky Mountain land a type of plant life has found a home which is sturdy enough to withstand the chills of winter and the wither of drouth... It requires not only intensive study of the region's plants, its climate, its ways of plant maintenance, but it needs more than that; it requires an understanding of the landscape of the Rockies. It can be taught nowhere but here."

On the election of Mrs. John Evans as president of Colorado Forestry and Horticulture Association the Society entered a new era. Mrs. Evans generously provided a headquarters rent free, and in June, 1946 the Association moved into its new home.

This delightful Victorian house at 1355 Bannock Street had been transformed into an efficient unit with book shelves, well-arranged tables, a director's office, and kitchen facilities. A quaint curving stairway led to the custodian's quarters above.

Privately supported by special donations, by membership dues, and with the assistance of many working volunteers, the association prospered. From year to year, Mrs. Evans, in her annual report, stressed the association's continued efforts to obtain a botanic garden. Various sites were considered. Among these were certain clay pits south of Denver University. Old Overland Park on the Platte River was suggested as a possible war memorial in 1944. Finally, Inspiration Point in North Denver with its 200 acre plot seemed ideal with its superb mountain view, its stream bed and rolling terrain. Assurances of approval of this site by the city were given, indeed, it seemed a "fait accompli." Alas, to wake one morning and read of another use for this land near Berkeley Park!

So start again. Mr. Myron Blackmer was approached. He offered a 200 acre site on South University Boulevard where he had already made impressive plantings of evergreens. The city's unwillingness to assume the upkeep of such an acreage put an end to this plan.

So begin once more. City Park might be available. Studies were made of the

land surrounding the Museum of Natural History – about 100 acres.

Sometimes we forget that, on a certain day at a certain hour, a way may be shown.

At a meeting of the Executive Committee of Colorado Forestry and Horticulture Association at the home of its president, Mrs. John Evans, Mr. Evans spoke as a friendly advisor. He presented a new plan. He suggested that often, unless the city receives a gift, action on a proposed project may be delayed indefinitely. He then said that he and Mrs. Evans would finance the preparation of a detailed plan for a botanic garden in City Park. Mr. S. R. DeBoer, Denver's now nationally-known city planner and long-time advocate of such a garden, would make these detailed drawings.

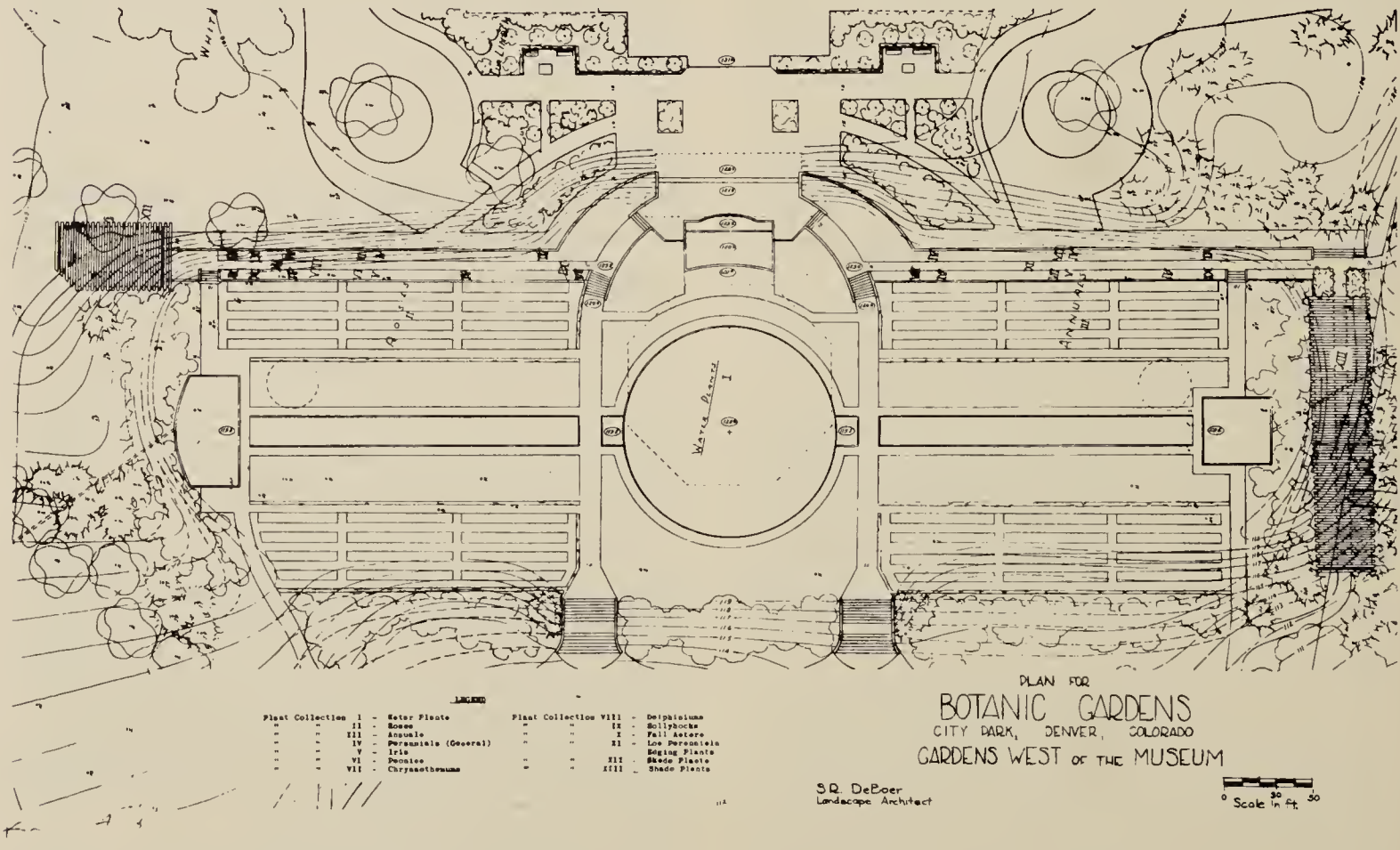
At last, on a sunny afternoon in 1951, on the terrace in front of the Museum of Natural History in City Park, in the presence of city officials and officers of CF&HA, this plan, donated by Mr. and Mrs. John Evans, was accepted by the City of Denver, and Denver's Botanic Gardens became a reality.

Mr. DeBoer's plan was published by the city in book form. Management of the Gardens was vested in a Board of Trustees who were to serve without remuneration.

Work began promptly. An interesting feature of the plan was a rocky canyon simulating high mountain terrain. This was built to the southwest of the museum. Large boulders were brought in – a generous gift of the Gates family. From this height a stream meandered through the meadow ending in a lily pond. Alpines were to be planted in the canyon, followed by plantings typical of each succeeding zone to the plains. What a fascinating and original idea!

A conservatory surrounded by various plant collections was included in the plan with plantings of additional collections indicated in other areas.

In a progress report to the CF&HA, May 1954, we note Helen Fowler's fern collection, Mr. DeBoer's collection of 47 flowering crabapples, Milton Keegan's French hybrid lilacs, LeMoine Bechtold's hemerocallis, as well as his and Dr. John Durrance's iris. The Denver Rose Society sponsored plantings of 4,000 roses; and Robert More gave the pinetum, a unique



A part of S. R. DeBoer's plan for a Botanic Garden at City Park

collection of 250 varieties of evergreens. These were a reality, to be seen and enjoyed.

In 1956, Robert Woerner, graduate landscape architect and horticulturist, was selected by the Trustees to direct the Gardens. He was installed in an office in the basement of the museum. The idea had indeed taken form.

In tracing the development of an idea we have spoken of but one facet of the varied career of this practical idealist, S. R. DeBoer, to whom we owe so much.

We have followed the course of his constant and undeviating efforts to obtain a proper research center, a Botanic Garden, in this unique western land. We have seen how, coming as a stranger, he remained to dedicate his life to his adopted countryside.

In grateful remembrance we dedicate this issue of *The Green Thumb* to Saco Rienk DeBoer, the man who first presented the idea.

An explanatory footnote should accompany this account of the beginnings of Denver Botanic Gardens. What caused a change of plan and of location?

The Botanic Gardens Trustees were soon confronted by a serious problem. City Park was used increasingly as a recreational area. The depradation in the herbaceous sector of the Gardens was incredible. The Gates canyon became a challenge to youthful rock climbers who gaily leaped from boulder to boulder. Mrs. Fowler's choice ferns on a shaded slope presented an ideal hillside for the young bicycler. A $25 iris planted on Monday was purloined on Tuesday by unscrupulous collectors. Newest hybrid roses met their end in the nearby fountain or suffered the same fate as the iris. The fencing of 100 acres was not acceptable to the city. Effective policing was impossible, and our headquarters were proving inadequate.

It was at this point that Mrs. James Waring offered to purchase a headquarters building at 909 York Street adjacent to an 18 acre plot once occupied by Mt. Calvary Cemetery but now owned by the city. The gift's provision stipulated that the Board of Trustees raise a matching sum – $55,000. Denver Botanic Gardens' larger woody collections in City Park remain there but the herbaceous unit has moved to this protected area and the proposed conservatory has been built there.

This house, formerly the residence of Mr. and Mrs. Richard Crawford Campbell, the architect Jules Jacques Benois Benedict, and its surrounding garden planned by Irvin McCrary, is worthy of preservation by the National Trust.

With the acquisition, space in the headquarters building was offered to Colorado Forestry and Horticulture Association whose members had borne so much of the responsibility for the establishment of Denver Botanic Gardens. At this time, however, this privately supported association faced financial difficulties and it seemed expedient to fuse this group with the now well established Denver Botanic Gardens. Its membership lists were helpful. Its publication *The Green Thumb*, the Helen Fowler Library, and the Kathryn Kalmbach Herbarium remain permanent reminders of this dedicated fellowship, The Colorado Forestry and Horticulture Association.

Let us remind ourselves once more of Mrs. Kalmbach's original motion of 1941 on the establishment of a Botanic Garden comprised of many units at varying altitudes. With the completion of our most distinguished gift, the Boettcher Conservatory and the adjacent Education Building in the herbaceous unit we have an impressive setting for education and research. As a Botanic Garden our situation is unique with an alpine unit on Mt. Goliath and the legacy of land in the montane zone at Evergreen.

Another challenging opportunity now presents itself in the possible acquisition of an area at Chatfield Dam where important environmental studies may be made.

Again! The idea precedes the accomplishment.

Denver's Municipal Landscaping

Katharine Bruderlin Crisp

In 1949 S. R. DeBoer wrote, "Denver's growth for the last fifty years has been around its parks. The major part of the park system was created in the first fifteen years of this period." And, we know, a major figure in the creation of that park system was Mr. DeBoer himself.

Denver's landscape planning began with the work of Reinhard Scheutze who was engaged by the city in 1894 and held the office of landscape architect until his death in 1909. S. R. DeBoer was the city's landscape architect from 1910 until 1931, and became its city planning engineer and park consultant in 1932.

During the administration of Mayor Speer, 1904 to 1912, and 1916 to 1918, the city of Denver became "park-minded" and as a result, "tree-minded". Mayor Speer wished to make Denver the most beautiful city in the world. He created the present system of parks and boulevards, with Mr. DeBoer as planner and planter. Experimental tree planting was begun then, and included a forest belt eighty feet wide on the south side of Cherry Creek from Broadway to Clarkson Street. A city dump on the west side of Broadway near Cherry Creek was transformed into the Sunken Gardens, one of the most beautiful spots in the city, with its evergreen forest and a natural rock garden.

Mayor Speer's forward looking developments included the city's system of sanitary and storm sewers, its surfaced and curbed streets, the Denver Auditorium, the public bath house, and the many children's playgrounds. He was instrumental in the erection of the Museum of Natural History in City Park and in establishing Inspiration Point. Perhaps he was proudest of the walling of Cherry Creek and the construction of the handsome boulevard on its right bank to which his name was given by City Council.

The experimental tree planting begun under Mayor Speer changed the city from a treeless plain spotted with clumps of broadleaf cottonwood, fringes of willows along the creeks, a few boxelders and lanceleaf cottonwoods, into a great green city which is the envy of metropolitan cities of the world. By 1933 there were 105 species of trees, representing 23 families and 37 genera, in Denver.

Mr. DeBoer and others learned that Denver's unusual climate makes growing conditions difficult on the Rocky Mountain Plateau with its characteristics of low temperature, sudden and extreme temperature changes, bright sunlight, alkaline soils and dry atmosphere. They found that occasionally specimens of varieties which are not hardy may become acclimated and their descendents (from seeds or from cuttings) may be sufficiently hardy for use in this area. Such experimentation and knowledge is vital to the continued beautification of our city.

Along with learning the conditions and overcoming them, the horticulturists developed our parks. Now we can't do without them. As Mr. DeBoer has said: "Parks have furnished recreation for Denver for forty years (now 70 years). This is a service needed today more than ever before. Parks are the only places in the city where traffic and noises are kept to

a minimum." They create the livability of a neighborhood and are a factor in the economic life of Denver.

The parks and their connecting parkways establish what Mr. DeBoer calls "flower trails." In his book, *Around the Seasons,* he describes parts of the trails. "At blossom time few places can be more attractive than the corner of Denver around the Downing street bridge. At this spot, groups of crabapples have been planted. Together with the yellow streamers of the Russian willows they make a picture. Further south are the double flowering Bechtel's crabapples. They are later and have beautiful double flowers."

Planning and working for beauty in Denver, Mr. DeBoer and others realized the need for a botanic garden as a center for horticultural demonstration and education. When a botanic garden was first attempted in City Park, Mr. DeBoer made the master plan for it. Parts of the plan are still evident in the park.

This planner and planter has expressed his concern for the future of the beauty that he labored to create, in these words: "Has the idea of quiet places in a noisy world, natural beauty in a sea of buildings and play in attractive surroundings become obsolete? Do we still believe that trees and flowers are a worthwhile asset in our cities?"

Around the Seasons in Denver Parks and Gardens by S. R. DeBoer. Illustrations by Frances White. Smith-Brooks Press, Denver. 1948

A *Master Plan* for Denver's Parks by S. R. DeBoer. Illustrated by Frances White. City of Denver, Dept. of Improvements and Parks. 1949

Master Plan for a Botanic Garden in Denver. Prepared by S. R. DeBoer & Co. Illustrated by Mrs. Frances White Novitt. Botanical Gardens Foundations of Denver, Inc. 1952



De Boer Plan – C. C. Gates Residence Bear Creek – 1920

The DeBoer Story

Wes Woodward

A turbulent river of automobiles rushes constantly and eratically along the four main streets that enclose Denver's City Park. Few in those mechanical contraptions see and enjoy the stately old trees, the "big, sloping lawns," and colorful shrubs planted there long ago by S. R. DeBoer.

Trees, lawns, shrubs — beauty — are not wasted. Several generations, now, have used and enjoyed that park. Even though this green oasis may be a little tarnished and often taken for granted by the motorists, it is thoroughly appreciated by those who use it. Our love of beauty and tranquility is not dead, it is only frustrated and thwarted. The deep need for natural beauty is demonstrated by the growth and popularity of Denver Botanic Gardens.

This is what Mr. DeBoer has given us: a legacy of beauty and a vision of what can be done.

The man himself has been quiet and shy, with an air of old-world dignity. I have the memory of an evening, some ten years ago, spent with him in the old farm house he describes in his story. After hours of leisurely and comfortable talk, enlivened by his frequent sharp observations, he arose from his chair and served me a bit of wine and some cakes, silently and with a formal grace. It was not the sort of thing that one old western engineer expects of another old western engineer. It was impressive.

Now, there are other memories. Recently, in preparing this issue of the magazine, I spent a bright autumn afternoon with Mr. DeBoer, his daughter, the gracious Mrs. Elizabeth Wright, and S. R.'s old friend, George Carlson. This time, I was impressed by the planner's clear memories and pungent comments.

Most important, as Elizabeth brought forth the pictures and books and mementos of her father's full life, I was impressed by the unbelievable productivity of this man. There is so much that he has done that doesn't appear in this magazine. Of necessity, the story is cut off, for practical purposes, at World War II. But the story did not end there. Dozens of projects, many of them of great importance to planning in the western states, followed one on top of another through a productive quarter of a century after our account ends.

Not only that, but I realized he has scarcely hinted at the inspiration and direction he furnished to all the work he has mentioned here briefly and impersonally. One has only to experience the intense loyalty and eagerness of the people who have worked with him, particularly Frances Novitt and George Carlson, to realize that his great story has only been partially told.

Frances Novitt, who worked for S. R.

DeBoer for some ten years, last year, in ill health herself, spent countless hours in recording and transcribing his words into a voluminous manuscript. This is the Frances White who made the lovely and appropriate drawings for Mr. DeBoer's book, *Around the Seasons.* She made this story possible.

Eagerness is the word for George Carlson. He is always eager to tell the DeBoer story and to assist anyone who works on it. He was part of the story. When I asked George how long he was with Mr. DeBoer, he blazed: "I'm *still* with him!

Anna R. Garrey! It's an experience to know her — a rather exciting experience. Her vitality and enthusiasm affected us all, held us to the mark in getting the story completed and published. Besides that, she saw to it that there were finances for the project. Her history of Denver Botanic Gardens, told in her distinctive way, is essential to this issue.

Katharine Bruderlin Crisp, successful author, teacher and gardener, chairman of the editorial committee for many years and still active on that committee, has written an appreciation of Mr. DeBoer's work that tells us of her, and our, esteem for him.

There were others. Jo Ellen Foerch assisted in editing and rewriting portions of the manuscript. She's an expert. We welcome the art of Eileen Bloustein who volunteered, with enthusiasm, to make many of the drawings we needed. The work of Suzanne Ash, as always, is lovely and appreciated. Solange Huggins's research work was essential to the story. Several departments of the Denver Public Library, especially the Western History Department, cooperated in their usual efficient and thorough way. And Pete — Bernice Petersen — was always there, always working for us all.

The manuscript and the pictures, the memories and stories that came to me, would have filled, comfortably, some 200 pages in the *Green Thumb*. It would have been nice to spend two years in proper preparation of it all. In reducing and selecting this material I have, I know, left out things that the people I have mentioned will miss. I am responsible for the errors and omissions.

This issue has been an expanding experience for me; working with creative and productive people whose goals, always, have been the good of all and the best possible job. They have given much.



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